Nutrient Management Protocols
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1 Part 1 - Introduction

This document is the "Nutrient Management Protocol" referred to in the regulations of the Nutrient Management Act. It is meant to outline technical and scientific details that are in addition to the standards set out in the regulations. The additional information is useful in developing nutrient management strategies and nutrient management plans that demonstrate compliance with the regulations.

1.1 *CATEGORIES OF OPERATIONS*

All operations that generate, store, use, or transport prescribed materials or commercial fertilizers used in crop production are categorized under the Nutrient Management Act. The categorization of these operations will facilitate implementation of the regulations and are outlined in the regulations.

1. Agricultural operations need to define their farm unit in order to place themselves into a category.

2. Non-agricultural operations are category 6.

3. Intermediate generators are category 9 and may or may not be agricultural operations but nevertheless have their own category because of this unique practice. They must follow the same requirements as agricultural operations.

1.2 *TERMINOLOGY AND CONTEXT*

A nutrient management strategy describes the management, storage, and the destination of the prescribed materials generated. All generators of a prescribed material are categorized and must complete a nutrient management strategy.

Prescribed materials are listed in the regulations and are broken down into agricultural and non-agricultural sources.

A nutrient management plan describes the management of land application of a prescribed material. If you own or control land that nutrients are applied to then you must complete a nutrient management plan.

Nutrients are both prescribed materials and commercial fertilizer.

Note for agricultural operations: it is possible for the operation to generate prescribed materials and apply them to land so they need to develop a nutrient management strategy and a nutrient management plan. This is further discussed later in this Protocol.

2 Part 2 - Define Your Operation

2.1 *AGRICULTURAL OPERATIONS NEED TO DEFINE THEIR FARM UNIT(S)*

Agricultural operations are further defined by the farm unit. A farm unit is described and defined by the regulation. An operation must first define their farm unit in order to put the operation into a category.

A declaration has to be made that identifies all the land and any facilities in the farm unit. The **farm unit Declaration Form** is used to make this declaration. One form is required for each farm unit declared. Ontario Ministry of Agriculture and Food (OMAF) will devise a numbering system for farm units, and this number will be called the farm unit identifier.

- An operator of an agricultural operation may declare more than one farm unit within their operation.
- There is no minimum land ownership requirement for the land included in the farm unit. Manure/Biosolid Application Agreements for the property that is not owned by the farm unit operator are required.
- There is no maximum amount (cap) of nutrient units per farm unit.
- A nutrient management strategy and/or nutrient management plan must be completed for each farm unit.
- The farm unit Identifier must be noted on the (s) and plan(s) for that farm unit.

2.2 NON-AGRICULTURAL OPERATIONS

A non-agricultural operation under the Nutrient Management Act is an operation that generates land applied prescribed materials.

Examples of these operations are
- Municipal Sewage Treatment Plants
- Pulp and Paper Mills
- Operations whose nutrient material has been approved for land application by the Biosolids Utilization Committee (BUC).

BUC is a multi-stakeholder, inter-ministerial committee that provides a forum for information exchange, and that advises and makes recommendations to the MOE and OMAF on matters related to the utilization of biosolids and residuals on agricultural land. Those non-agricultural operations who wish to land apply their material, and have not already done so, must apply to BUC for approval of their material for land application.

These operations must create a nutrient management strategy and submit it to the Environmental Assessment and Approvals Branch of the Ministry of the Environment for review by the appointed time.

2.3 INTERMEDIATE GENERATORS

An "intermediate generator" is a person who controls an Intermediate operation carried out with nutrients not generated by that operation that results in the production of nutrient with characteristics different from those of the nutrient as it was received. Different characteristics are things such as: nutrient content, density and volume.

The types of Intermediate operations considered "intermediate generators" include composting, mushroom farming, and anaerobic digestion.

An intermediate generator must:

- Complete a nutrient management strategy for their operation;
- Identify the source generator's nutrient management strategy;
- Ensure adequate approvals and certificates are obtained for any processing methods or applications;
- Obtain an operation Identifier;
- Record all off-farm sourced materials required and approved for the process(es) used.

Generators that store, mix or process materials that fall under the EPA, are not included in Intermediate Generators. The standard requirement of a waste disposal CofA (transfer/processing) will continue to apply to these operations (i.e. leaf and yard composting is governed under Regulation 101, EPA)

3 Part 3 – Nutrient Units: How Agricultural Operations Categorize Their Farm Units that Generate or Receive Manure

Using the Nutrient Units **(NU)** concept helps ensure an 'apples to apples' comparison between sizes and types of farm units using the same set of input and output parameters. It is a better reflection of environmental risk to ground and surface water based on nutrients produced and applied; and will be more flexible to changes in the industry.

Nutrient Units **will not** be used to establish landbase requirements for a farm unit, since this will be based on the farm unit's specific nutrient management plan. It is **not** the same as Livestock Units, which are currently used in calculating Minimum Distance Separation (MDS) setbacks.

3.1 *DEFINITION OF A NUTRIENT UNIT USED TO ESTABLISH THE CATEGORY OF A FARM UNIT*

For agricultural operations that manage manure it is necessary to determine the number of nutrient units managed to establish what category they belong in:

- For Categories 5 through 9 the category is determined on the type of operation rather than the number of nutrient units managed.
- For Categories 1 through 4 the category is based on the amount of nutrient generated **or** received.
- For farm units that generate **and** receive they will have to determine two categories for the one farm unit. First the category of the farm unit based only on the number of NU generated and second, the category of the farm unit based only on the number of NU received. This farm unit will be need to do a nutrient management strategy and/or plan based on the phase in schedule and which of the two categories it has is brought in first. See the example in 3.3.2 of this Protocol.

3.2 *TABLES OF NUTRIENT UNIT ASSIGNMENTS TO CERTAIN FARM ANIMALS*

3.2.1 Number of animals per Nutrient Unit *on Farm Units* ***Generating*** *Manure*

Animal (based on highest design capacity of the farm unit at one time	**# Animals per NU**
Dairy cow (large-frame, 1200-1400 lbs, milking or dry, such as Holsteins)	0.7
Dairy heifers (large-frame, 400-1150 lbs, such as Holsteins)	2.0
Dairy calves (large-frame, 100-400 lbs, such as Holsteins)	6.0
* Dairy cow (large-frame, 1200-1400 lbs, milking or dry (Holsteins); includes calves/heifers)	*0.55
Dairy cow (medium-frame, 1000-1200 lbs, milking or dry, such as Guernseys)	0.85
Dairy heifers (medium-frame, 325-1000 lbs, such as Guernseys)	2.4
Dairy calves (medium-frame, 85-325 lbs, such as Guernseys)	7.0
* Dairy cow (medium-frame, 1000-1200 lbs, milking or dry (Guernseys); includes	*0.66

calves/heifers)	
Dairy cow (small-frame, 800-1000 lbs, milking or dry, such as Jerseys)	1.0
Dairy heifers (small-frame, 275-800 lbs, such as Jerseys)	2.9
Dairy calves (small-frame, 65-275 lbs, such as Jerseys)	8.5
*Dairy cow (small-frame, 800-1000 lbs, milking or dry (Jerseys); includes calves/heifers	*0.77
Beef cows (includes unweaned calf and replacements)	1.0
Beef shortkeepers (900-1300 lbs)	2.0
Beef backgrounders (575-900 lbs)	3.0
Beef feeders (575-1250 lbs)	3.0
SEW (Segregated Early Weaning) Sows (lactating-aged sows, includes weaners to 15 lbs)	3.33
SEW Weaners (15-60 lbs)	20.0
Sow farrow-wean (lactating-aged sows, includes weaners to 60 lbs)	2.5
Finishing pigs (60-230 lbs)	6.0
Horses (mature to 1000 lbs)	1.0
Laying hens (after 2.9 lbs pullet stage, until end of laying period at about 3.75 lbs)	150
Layer pullets (day-old pullets placed, raised to 2.9 lbs)	500
Chicken broilers, floor growing area (total square feet, regardless of quota cycle, or finishing weight)	267 sq.ft
Turkey broiler/hen/tom growing space (total square feet, regardless of finishing weight)	267 sq.ft
Chicken broiler breeder growers (females and males transferred out to layer barn)	300
Chicken broiler breeder layers (females and males transferred in from grower barn)	100
Sheep, breeding-aged ewes (sheep raised for meat production; includes lambs, replacements and rams)	8.0
Feeder lambs, 70 to 125 lbs	20
Sheep, milking-aged ewes (sheep raised for milk production; includes lambs, replacements and rams)	6.0
Goats, milking-aged goats (goats raised for milk production; includes kids, replacements and bucks)	8.0
Milk-fed, or grain-fed veal calves	6.0
Several more animals will be added, including mink, quail, rabbits, fish, etc. as more information is available, plus typical liveweights of animals housed at one time, for situations that do not 'fit' the table well. Also, choose the most appropriate figures where weights do not match your situation exactly.	

* Most dairy farms house cows, calves and heifers on the same farm unit, so this number already accounts for this. So, for 100 Holstein milking and dry cows in a herd, divide by 0.55 cows per Nutrient Unit to obtain 182 Nutrient Units for the entire herd including calves and heifers. If housed on separate farm units, do separate calculations, using the individual number of cows, heifers or calves per Nutrient Unit. There could be very slight discrepancies in the resulting number of NU because of the rounding of numbers.

3.2.2 *Amount of Manure per Nutrient Unit for Farm Units that Receive Manure Generated on Other Farm Units.*

For each farm unit determine the category you are in based on the type and quantity of manure received over a one year period on your farm unit, from the following chart.

Manure Type	Quantity of Manure Per Nutrient Unit (NU)	Category 1 ≤ 30 NU	Category 2 >30 NU but ≤ 150 NU	Category 3 >150 NU but ≤ 300 NU	Category 4 > 300 NU
	Tons of Manure Received				
Dry -Bedded, Poultry Manure	3	≤90	>90 but ≤450	>450 but ≤900	>900
Dry- Bedded, Beef Cattle Manure	10	≤300	>300 but ≤1500	>1500 but ≤3000	>3000
Dry -Bedded, Horse Manure	20	≤600	>600 but ≤3000	>3000 but ≤6000	>6000

3.2.3 *Examples of Typical Sizes of Farm Animal Operations Fitting the Four Categories*

Farm Units that generate manure are divided into four (4) categories of size based on the total number of *Nutrient Units* of animals on the farm unit at one time, whether housed or pastured. This is only valid for farm units that have one type of livestock only. It the farm unit has more than one type of livestock the combination of the NU generated by the two types will need to be used to determine the farm unit's category. See example 3.3.1 in this Protocol.

Animal Sector Examples (based on highest design capacity of all farm buildings on the farm unit, or pastured animals)	Category 1 ≤ 30 NU	Category 2 > 30, but ≤ 150 NU	Category 3 > 150, but ≤ 300 NU	Category 4 > 300 NU
Milking-aged Holstein dairy cows (includes calves & heifers, so use 0.55 dairy cows/NU)	≤ 17	> 17, but ≤ 82	> 82, but ≤ 165	> 165
Milking-aged Guernsey dairy cows (includes calves & heifers, so use 0.66 dairy cows/NU)	≤ 20	> 20, but ≤ 99	> 99, but ≤ 198	> 198
Milking-aged Jersey dairy cows (includes calves & heifers, so use 0.77 dairy cows/NU)	≤ 23	> 23, but ≤ 115	> 115, but ≤ 231	> 231
Beef cows (including unweaned calf & replacements)	≤ 30	> 30, but ≤ 150	> 150, but ≤ 300	> 300
Beef shortkeepers (900-1300 lbs) (# of feedlot spaces)	≤ 60	> 60, but ≤ 300	> 300, but ≤ 600	> 600
Beef backgrounders (575-900 lbs) (# of feedlot spaces)	≤ 90	> 90, but ≤ 450	> 450, but ≤ 900	> 900
Beef feeders (575-1250 lbs) (# of feedlot spaces)	≤ 90	> 90, but ≤ 450	> 450, but ≤ 900	> 900
SEW Sows (lactating-aged sows; includes weaners to 15 lbs)	≤ 100	> 100, but ≤ 500	> 500, but ≤ 1,000	> 1,000
SEW Weaners (15-60 lbs) (# of weaner spaces)	≤ 600	> 600, but ≤ 3,000	> 3,000, but ≤ 6,000	> 6,000
Sow farrow-wean (lactating-aged sows; includes weaners to 60 lbs)	≤ 75	> 75, but ≤ 375	> 375, but ≤ 750	> 750
Finishing pigs (60-230 lbs) (# of spaces in barn)	≤ 180	> 180, but ≤ 900	> 900, but ≤ 1,800	> 1,800
Horses (mature at 1000 lbs) (# of spaces in barn)	≤ 30	> 30, but ≤ 150	> 150, but ≤ 300	> 300
Laying hens (# of layer spaces in barn)	≤ 4,500	> 4,500, but ≤ 22,500	> 22,500, but ≤ 45,000	> 45,000
Layer pullets (# of pullet spaces in barn)	≤ 15,000	> 15,000, but ≤ 75,000	> 75,000, but ≤ 150,000	> 150,000
Chicken broilers (total sq.ft of floor growing area)	≤ 8,000 sq.ft	> 8,000, but ≤40,000 sq.ft	> 40,000, but ≤80,000 sq.ft	> 80,000 sq.ft

		≤40,000 sq.ft	≤80,000 sq.ft	
Turkey broilers/hens/toms (total sq.ft of floor growing area)	≤ 8,000 sq.ft	> 8,000, but ≤40,000 sq.ft	> 40,000, but ≤80,000 sq.ft	> 80,000 sq.ft
Chicken broiler breeder growers (females and males transferred out to layer barn)	≤ 9,000	> 9,000, but ≤ 45,000	> 45,000, but ≤ 90,000	> 90,000
Chicken broiler breeder layers (females and males transferred in from grower barn)	≤ 3,000	> 3,000, but ≤ 15,000	> 15,000, but ≤ 30,000	> 30,000
Sheep, for meat (# of breeding ewes; includes lambs, replacements and rams)	≤ 240	> 240, but ≤ 3,750	> 3,750, but ≤ 2,400	> 2,400
Feeder lambs, 70 to 125 lbs	≤ 600	> 600, but ≤ 3,000	> 3,000, but ≤ 6,000	> 6,000
Sheep, dairy (# of milking-aged ewes; includes lambs, replacements and rams)	≤ 180	> 180, but ≤ 900	> 900, but ≤ 1,800	> 1,800
Goats, dairy (# of milking-aged goats; includes kids, replacements and bucks)	≤ 240	> 240, but ≤ 1,200	> 1,200, but ≤ 2,400	> 2,400
Milk or grain-fed veal (# of spaces)	≤ 180	> 180, but ≤ 900	> 900, but ≤ 1,800	> 1,800
More animals & systems to be added over time				

3.3 *EXAMPLE CALCULATION OF NUTRIENT UNITS FOR OPERATIONS THAT GENERATE OR RECEIVE MANURE*

3.3.1 Example for calculating the number of Nutrient Units on a Farm Unit that generates manure and establishing what category of size it is:

A dairy farmer has 70 Holstein cows (milking and dry, and considered as large-frame cows), with all calves and heifers kept on the same farm unit. Across the road, she also has two 40' x 300' x 2 story chicken broiler barns (48,000 square feet of floor growing area). The entire operation is managed as one farm unit.

70 Holstein cows ÷ 0.55 dairy cows/NU (when calves and heifers are included) = 127 NU
48,000 square feet of floor growing area ÷ 267 square feet/NU = 180 NU
307 NU

So, this farm **generates** enough manure to place it into **category 4.**

3.3.2 *Example for calculating the number of Nutrient Units on a Farm Unit that generates and receives manure and establishing what category of size it is:*

A farmer has farm buildings that will house at one time, 1200 finishing pigs, 9000 laying hens, and 60 beef feeders raised from about [a]575 lbs to 1250 lbs. He also receives 72 tons of dry-bedded poultry manure from the farm down the road. The entire farm is operated as one farm unit.

1200 finishing pigs ÷ 6 finishing pigs/NU =	200 NU
9000 laying hens ÷ 150 laying hens/NU =	60 NU
60 beef feeders ÷ 3 beef feeders/NU =	20 NU
	280 NU

Although the 72 tons of dry-bedded poultry manure (24 NU) that this farm receives must be included in the farm's nutrient management plan, it does not bump-up this farm's category. So, this farm generates enough manure to place it into category 3, not category 4. This farm unit must now consider its two category types. Category 3 for how much it generates and category 1 for the dry-bedded poultry manure it receives. It will therefore be phased into the regulations by the dates set for category 3 because that is sooner than the dates for category 1.

Note that start and end weights may vary slightly from those in the table, since it is impossible to predict every situation. In these cases, choose the most appropriate figures.

3.3.3 *Example for calculating the number of Nutrient Units on a Farm Unit that receives manure and establishing what category of size it is:*

A corn producer receives 600 tons of dry-bedded poultry manure for his farm unit from manure.

600 tons of dry-bedded poultry manure ÷ 3 tons/NU = 200 NU

So, this farm receives enough manure to place it into category 3.

4 Part 4 – Introduction to Nutrient Management Strategies and Plans

4.1 *PURPOSE*

4.1.1 Nutrient Management Strategy

A nutrient management strategy accounts for the management of all generated and received prescribed materials in an environmentally acceptable manner. **All generators of prescribed materials must complete a nutrient management strategy as phased in by the regulations.**

4.1.2 Nutrient Management Plan

A nutrient management plan (NMP) details how nutrients are to be applied to a given landbase. A nutrient management plan is based on both the components of the nutrients used and the characteristics of the field. Together these are balanced to maximize the utilization of the nutrients by crops and to reduce environmental impacts. **All farm units who apply nutrients to agricultural land must complete a nutrient management plan as phased in by the regulations**.

4.2 *NMAN*

A nutrient management strategy or plan is completed using the NMAN Software program or the associated workbook developed by OMAF. These two methods are designed to either produce or accommodate **all** of the components of the nutrient management strategy and plan. Current versions of both can be found on the OMAF website. Both are going to serve as Appendices to this Protocol.

The person developing a nutrient management strategy or plan should use the most recent version of NMAN software or associated workbook.

For a farm unit, the farmer, with training from OMAF, can develop the plan on their own or they can hire a consultant trained and certified as per the regulations, to provide that service to them. For a non-agricultural operation that is developing a nutrient management strategy the same applies.

4.3 *THE DIFFERENCE BETWEEN NUTRIENT MANAGEMENT STRATEGY AND PLAN*

Prior to the Nutrient Management Act a 'nutrient management plan' was typically used for livestock operations and included information about the production and storage of manure as well as the field by field plan for application of the manure plus any commercial fertilizer or biosolids utilized on the farm. The Nutrient Management Act however, encompasses more than just livestock operations and the scope of the 'nutrient management plan' has been altered to accommodate other types of generators. Such non-agricultural nutrient generators include: municipal sewage treatment plants, pulp and paper mills as well as other agricultural generators such as greenhouses, vegetable

processing plants etc. Hence the division of the original 'nutrient management plan' into two parts: a nutrient management strategy for the production and storage of prescribed materials, and the nutrient management plan dealing exclusively with the field by field details for application of nutrients.

Nutrient management plans are completed for agricultural operations that apply nutrients to land. Nutrient management strategies are completed by all generators of prescribed materials including both agricultural and non-agricultural generators.

A nutrient management strategy, for generators (agricultural and non-agricultural), includes the following components that are **also** found in the required components of a nutrient management plan:

- Description of the operation
- Contingency plan
- Nutrient analysis
- List of storage facilities

And if the operation is a farm unit then:
- Farm Unit Declaration Form
- Farm unit sketch

4.3.1 Agricultural Operations that Don't Generate

When an agricultural operation that **doesn't generate** any prescribed materials (i.e. a cash crop operation) does a nutrient management plan, it is required to complete the components in the above list. There is still the need to give the description of the operation, provide a contingency plan and a nutrient analysis because they provide context for the rest of the nutrient management plan. Finally, these farm units require adequate storage for any nutrients received or used on the farm prior to application. Information pertaining to the generation of prescribed materials and the destinations other than land application do not have to be included.

4.3.2 Agricultural Operations that Do Generate

When an agricultural operation **does generate** and land applies (all of part of their prescribed materials) then they will be required to complete both a nutrient management strategy and plan (see Part 4 of this Protocol). In this case the components listed above only need to be completed once and the nutrient management strategy and plan must reference each other and should be kept together, especially for approval, certification, and inspection/enforcement processes.

4.4 *LETTERING FOR IDENTIFICATION OF THE COMPONENTS*

Within this protocol, all of the required components of a nutrient management strategy and nutrient management plan have been assigned a 'letter of the alphabet'. Wherever the same letter appears in two places in the Protocol, it refers to the same component. Because the nutrient management strategy and plan do not require all of the same components, all of the letters do not apear in the description of both.

	Content	Protocol Letter	Required in a Strategy	Required in a Plan
Operation Information	Description of the Operation	A	Yes (Y)	Y
	Agreements	C	Y	Y
For Farm Units	Farm Unit Declaration Form	B	Y	Y
	Farm Unit Sketch	D	Y	Y
	Minimum Distance Separation II	E	Y	N
Inventory and Description of Prescribed Materials	List of Prescribed Materials (generated and received)	F	Y	Y
	Nutrient Analysis	G	Y	Y
Destination and Storage	Destinations	H	Y	N
	Storage Facilities	I	Y	Y
	Contingency Plan	J	Y	Y
	Certification Form	K	Y	Y
Field Information	Field Properties	L	No (N)	Y
	Field Sketches	M	N	Y
	Soil Samples and Analysis	N	N	Y
Crop Information	Crop Rotation and Yields	O	N	Y
	Tillage Practices	P	N	Y
Nutrient Application Information	Commercial Fertilizer Application	Q	N	Y
	Application of Prescribed Materials	R	N	Y
	Agronomic and Crop Removal Balance for Nitrogen	S	N	Y
	Nitrogen Index	T	N	Y
	Application Limits for Phosphorous	U	N	Y
	Phosphorous Index	V	N	Y
	Common Land Application Setbacks/Limits	W	N	Y
	Demonstration of Adequate Landbase	X	N	Y

5 Part 5 - Nutrient Management Strategy For Agricultural Operations

5.1 *REVIEW AND RENEWAL OF A NUTRIENT MANAGEMENT STRATEGY*

A nutrient management strategy should be **reviewed** by the generator annually to ensure that it is still relevant and to recognize and account for any deviation from the strategy indicated in records kept of actual events.

All Nutrient Management Strategies must be **renewed** every five years. Renewal means to make amendments to the nutrient management strategy to account for changes over the last five years and to prepare for events over the next five years. If any of the following situations occur then the nutrient management strategy must be renewed before the end of the five-year cycle.

Situations requiring early renewal of a nutrient management strategy:

- the end of a year in which there is an increase of 20% or more in the quantity of nutrients generated or received at the operation since the first year of the nutrient management strategy;
- there is a change in ownership or control of the operation that adversely affects the capacity of the new operator to implement the fist nutrient management strategy;
- a change in the use of nutrients generated on the operation (e.g. to be processed by an intermediate operation rather than land applied);
- the end of a year in which there is an increase by 30 nutrient units or more in the quantity of nutrients exported to any other single operation since the previous year.;
- the commencement of operation of a new generating facility or nutrient storage facility .
- a Ministry of the Environment (MOE) Provincial Officer orders the nutrient management strategy to be updated.

5.2 *REQUIRED CONTENTS OF A NUTRIENT MANAGEMENT STRATEGY*

The nutrient management strategy must account for the total quantity of prescribed materials generated or received.

5.2.1 Operation Information and Identifier Numbers

Every operation will have a number to identify it. For farms this number is used to identify the farm unit and is therefore called the operation identifier and will be assigned by OMAF. For other generators this number will be referenced in this protocol as the operation identifier and will be assigned to operations by a provincial ministry.

A. Description of the Operation

A description must give details about the general type of operation that the nutrient management strategy is being prepared for as well as the size of operation and the prescribed material being produced. It must include the name and contact information for the operator of the operation if that hasn't already been done using the General Screen in NMAN. The description should also contain any unique or unusual details about the operation and indicate whether the nutrient management strategy is new or is a renewal.

B. Farm Unit Declaration Form

For an agricultural operation only, there is a required Farm Unit Declaration. It identifies the contact information for the farm unit operator and identifies the facilities and landbase associated with the operation. The Farm Unit Declaration is described in Part 2 of this protocol and can be completed using either the Farm Unit Declaration Form or generated using the farm unit Screen in NMAN.

C. Agreements

Agreements are necessary to demonstrate two types of events.

- an operation is, for a specified period of time, in control of a certain identified landbase, and
- nutrients are being transferred from one operation to another, which results in a change in the quantity of nutrients that each operation must account for in their nutrient management strategy.

Agreements must be signed and attached to the nutrient management strategy. There are three types of agreements recognized by the regulations and they can be found in Part 16 of this Protocol. They are:

Type of Agreement	Details
Broker Agreement	A broker agreement represents either a transfer from a generator to a broker or a transfer from a broker to a receiver. Each party to the agreement needs a signed copy. The broker must have the identifier of each generator or receiver they have an agreement with.
Nutrient Transfer Agreement	This form indicates that nutrients are being transferred to or from an operation and implies that that the nutrient management strategy and/or plan of each operation reflects that transfer.
Manure /Biosolid Application Agreement	This agreement documents the landowner's consent to apply nutrients to land that is not owned by the operator of the operation doing the nutrient management strategy. This agreement implies that for the duration of the agreement the land covered by the agreement becomes part of the farm unit that is applying the nutrients. It is therefore also part of the farm unit Declaration of that farm unit.

D. Farm Unit Sketch
Maps or sketches can be hand drawn, photos, or computer generated. A farm unit operator/controller may choose to do more than one sketch if it isn't possible to show the land belonging to the farm unit on one sketch or if there is too much information for one sketch. NMAN has placeholders for scanned images or links to picture files. Every map or sketch should be neat and readable and be presented with the direction north to the top of the page, denoted by a north arrow.

The sketch must address (either include or state that they don't' exist) the following items:

Location of all the landbase declared in the farm unit:
- Land that is owned or they have Manure/Biosolid Application Agreements for.
- Road names, municipality boundaries, neighbours, and other local features

Location of generation facilities and storage(s):
- Permanent, temporary and proposed generating facilities
- Permanent, temporary and proposed storage facilities
- Distance between facilities and distance to other buildings
- Dimensions of all facilities

Location of sensitive features:
- Known wells (includes gas, oil, test and water wells)
- Surface water (as defined in Part 9 of this Protocol)
- Residences and other designated health or educational facilities (as defined in Part 9 of this Protocol)

E. Minimum Distance Separation II (MDS II) Calculations
If the operation is new or expanding then a copy of the MDS II calculations issued or approved by the local building official or the director must be attached. For strategies that are being renewed or that don't represent a change in the farm animal facilities, no MDS calculation is required.

5.2.2 Inventory and Description of Prescribed Materials Produced and Received

F. List of Prescribed Materials
Every nutrient management strategy must have a list of all the prescribed materials generated and/or received that the operation manages. The list should be broken down into liquids and solids.

Prescribed Materials Received at an Operation
From the list of prescribed materials for the operation the following information is needed for prescribed materials that are received.

- Name of Generator and the generating operations identifier number
- Volume received
- Date received

- Applicable agreements (Nutrient Transfer Agreement or Broker Agreement)

Prescribed Materials Generated at an Operation

Manure
All the calculations with respect to the generation of manure can be done using the NMAN program or the workbook.

Farm animal Numbers
The number of livestock has to be stated and must be equal to or greater than standard OMAF housing capacity guidelines to ensure sufficient landbase should the farm unit fill to capacity during the period of time covered by the nutrient management strategy. A comprehensive explanation must be included if the number of farm animal housed is less than barn capacity to justify why fewer animals are in the barn if that is the case.

Animal Weights
If the nutrient management strategy utilizes animal weights that are lower than the default MSTOR values, a written explanation must be included to explain the lower weights.

Manure Volume
The total volume for each type of manure generated annually on the farm unit must be given in the nutrient management strategy. It must equal or exceed the annual volume of manure produced by all farm animal and poultry facilities on the farm unit.

Other Prescribed Materials (e.g. greenhouse and container nursery leachate)
The quantity of prescribed materials generated other than manure must be given using industry specific documentation or records from previous time periods that can project the quantity to be produced over the time period covered by the nutrient management strategy

G. Nutrient Analysis
A nutrient analysis for each of the prescribed materials in the nutrient management strategy must be provided. The nutrient analysis can be achieved either by conducting an actual lab analysis or by applying the NMAN databank average for that prescribed material type and projected dry matter. In either case the lab analysis or an update of the databank results must be incorporated into the nutrient management strategy every 5 years. For category 4 farm units an actual laboratory analysis of the nutrients is required for prescribed materials.

Lab Analysis
Lab analysis and sampling must be conducted in accordance with the sampling and analysis protocol in Part 14 of this Protocol. When laboratory analysis is conducted the nutrient content must be within 30% of the NMAN databank values for the same types of prescribed materials unless documentation is included that justifies a greater difference. For example, management practices or feed additives could potentially alter the nutrient content of a farm animal's manure.

Feed Additives

If manure nutrients are modified due to the use of feed additives, adequate information must be attached to verify that the feed additive was actually used, and to verify the influence of the additive on the nutrient content of the manure.

5.2.3 Destination of Nutrients Summary

H. Destinations
For all prescribed materials generated and received on the operation a detailed description of its intended destination is necessary. An acceptable description would include the quantity and type of prescribed materials and would be one of the following from the operation's list:

- Completed agreement forms when applicable
- A written description of a non-nutrient destination including location and name of the destination.

The possible destinations are summarized as follows:

1. Prescribed materials are going to be used for nutrient purposes:

   a) They are going to be applied to land according to the nutrient management plan for the same farm unit.

   b) They are going to be transferred to the nutrient management strategy of another operation.

   c) They are going to be transferred to the nutrient management plan of another farm unit through a Nutrient Transfer Agreement.

   d) They are going to be transferred to a broker through a Broker Agreement.

2. Prescribed Materials are going to be managed through non-nutrient purposes.

5.2.4 Storage Information

I. Storage Facilities
Storage facilities on the operations must be listed. For each storage a description is required that gives the capacity, dimensions and type of storage (circular, rectangle, pile, covered, exposed to precipitation, etc). If nutrients that are received are not stored at the operations before they are used then an explanation is required (i.e. custom applied biosolids).

Nutrient storage must comply with the regulations for capacity and siting set out under the Nutrient Management Act.

5.2.5 Contingency Plan and Certification Form

J. Contingency Plan

A written contingency plan is required that outlines alternative actions in the event that the nutrient management strategy cannot be followed. See Part 11 of this Protocol on contingency planning.

K. Certification Form
The certification form serves as a sign-off document for the operation's operator, the person who prepared the nutrient management strategy, and if applicable the OMAF reviewer. The Certification Form is in Part 16 on forms.

Completed Nutrient Management Strategy
The nutrient management strategy is a subset of the printouts that NMAN can provide or the applicable sections of the workbook.

A completed nutrient management strategy would be available for inspection and must include:

1. Certification Form
2. Farm Unit Information (declaration and identifier)
3. Agreements
4. Farm Unit Sketch
5. Minimum Distance Separation II
6. Contingency Plan

Printouts from NMAN or workbook sections:
7. For each farm property a Farm Information sheet (location, roll #,generator or not, name)
8. Manure/Nutrient Source Summary
9. Manure/Nutrient Information (type, analysis etc)
10. Storage Information (Yearly amount, days of storage, amount remaining etc)
11. Storage Sizing Calculations
12. Destination Summary and descriptions

6 Part 6 - Nutrient Management Strategy for Non-Agricultural Generating Operations

6.1 *GENERAL*

A nutrient management strategy accounts for the management of all generated prescribed materials in an environmentally acceptable manner. **All non-agricultural nutrient generators of prescribed materials, that land apply their materials must complete a nutrient management strategy and submit it to MOE's Environmental Assessment and Approval Branch in the prescribed timeframe.**

6.2 *REVIEW AND RENEWAL OF A NUTRIENT MANAGEMENT STRATEGY*

All Nutrient Management Strategies must be renewed every five years or sooner in the event that one of the following situations occurs:

- A change in the legal name of the generator/owner.
- A 20% or more change in the amount of nutrients generated.
- A change in the quality of the materials occurs which affects nutrient content.
- An MOE Provincial Officer orders the strategy to be updated.

6.3 *REQUIRED CONTENTS OF A NUTRIENT MANAGEMENT STRATEGY FOR NON-AGRICULTURAL NUTRIENT GENERATING OPERATIONS*

6.3.1 Facility Description and Approval Information

Part i. Facility Description and Approval Information
The initial part of the strategy includes a description of the operation, such as name of the facility, postal address, a contact name of the operation with their signature (i.e. person responsible for the strategy) and the total annual volume of material generated. The description section also includes the date of submission to the Ministry of the Environment, the approval date, the approving MOE director and their signature and the expiry date of the strategy.

6.3.2 Material Description and Storage Information

Part ii. Material Description and Storage Information
Part ii includes a description of the types of nutrient material produced. The type for example, could include sewage biosolids, paper biosolids or some type of process wastewater. A description of the form of the nutrient such as liquid or solid is also included. Solid prescribed materials contain less than 82% moisture or meet the requirement of the "Slump Test" as defined in EPA Regulation 347. The average annual volume should be given related to the period of the strategy, on an annual basis.

Information on storage of all prescribed nutrients generated at the facility must be given. On and off site storage must be listed with pertinent C of A numbers and their expiry date and the storage capacity.

Nutrient storage must comply with the regulations for construction and siting set out under the Nutrient Management Act. Structural aspects of the storage must meet the standards under the Ontario Building Code.

6.3.3 Five Year Projected Strategy for Management of Material Generated

Part iii. Five Year Projected Strategy for Nutrient Material Generated
A five- year volume projection must be included for the various management methods of the nutrient material. Methods include for example, land application, landfill disposal, incineration and processing such as composting. If there is a projected change in volume for any of the management methods, a description detailing why this is projected.

6.3.4 Nutrient Analysis of Material

Part iv. Analysis of Nutrient Material
The generator must provide both nutrient content and quality of their material. A laboratory nutrient analysis of heavy metals, odour and pathogens for the prescribed materials must be done to demonstrate compliance with the quality regulations. Although the standards requirements for biosolids are similar to those in the 1996 Biosolids Manual, sampling and testing requirements have been adjusted, based on size and capacity of the facility and the amount of material generated. An analysis must be done within a certain timeframe, and must be provided to the land applicator.

Additional contaminants are presently under review to develop new standards that will be set in regulation.

6.3.5 Contingency Plan

Part v. Contingency Plan
A written contingency plan is required the outlines alternative action in the event that the strategy cannot be followed. In this case, the contingency plan will include alternative action to be taken in the event of a storage irregularity or for alternate disposal of the nutrient material.
In the event of a spill, all non-agricultural facilities must follow a spills contingency referred to in Regulation 347, Part IX of the EPA.

6.3.6 Destination of Material

Part vi. Destination of Material
The destination of material, known at the time of submitting a NMS, can be summarized as follows:

- Applied to agricultural land with corresponding nutrient management plan numbers or Certificate of Approval (C of A) numbers and the corresponding expiry dates, the approved area in acres, application rate, total volume and site storage capacity, hauler identification (including System C of A numbers or certification numbers).

- Landfill Disposal management information sought will include name of the landfill site, total volume disposed, receiving site C of A numbers and daily, interim and final cover information.

- Incineration volume and whether it is on- or off-site with the C of A numbers if applicable.

- Process method type (such as composting), the total volume, on- and off-site information, and a C of A or nutrient management strategy number if applicable.

- Other management methods must also be documented including a description of the method, total volume disposed, on- and off-site information and a C of A or nutrient management strategy number if applicable.

6.3.7 Annual Report of Management of Material

Part vii. Report on Management of Materials Other Over Five Years – Land Application, Landfill, Incineration, Processed
This report requires essentially identical information as Part vi. However, it is the actual information that must be supplied by the generator annually and reported at the end of five years with a new NMS submission for approval by MOE.

The actual destination of the material can be reported as follows:

- Materials applied to agricultural land with corresponding nutrient management plan numbers or Certificate of Approval (C of A) numbers and the corresponding expiry dates, the actual area in acres, application rate, total volume applied and site storage capacity, hauler identification (including System C of A numbers or certification numbers).
- Landfill Disposal management information: name of the landfill site, total volume disposed, receiving site C of A numbers and daily, interim and final cover information.
- Incineration volume and whether it was on- or off-site with the C of A numbers if applicable.
- Processed materials such as composting, the total volume processed, on- and off-site information, and a C of A or nutrient management strategy number if applicable.
- Other management methods must also be documented if utilized including a description of the method, total volume disposed, on- and off-site information and a C of A or nutrient management strategy number if applicable.

6.3.8 Report on Five – Year Strategy for Material Generated

Report on Five Year Strategy of Nutrient Materials Generated
This report is similar in information requested as Part iii. A five-year volume of actual material must be included for the various management methods of the material. Methods include for example, land application, landfill disposal, incineration and processing such as composting. If there is a change from the strategy in volumes for any of the management methods, a description detailing why must be included.

7 Part 7 - Nutrient Management Plan

7.1 *REVIEW AND RENEWAL OF A PLAN*

A nutrient management plan should be **reviewed** by the farm unit operator annually to ensure that it is still relevant and to recognize and account for any deviation from the plan indicated in records kept of actual events.

All nutrient management plans must be **renewed** every five years. Renewal means to make amendments to the nutrient management plan to account for changes over the last five years and to prepare for events over the next five years. Should any of the following situations occur than the nutrient management plan must be renewed at that point, which is before the end of the five-year cycle.

Situations requiring early renewal of a nutrient management plan:

- The end of a year in which there is an increase of 20% or more in the quantity of prescribed materials received at the farm unit since the first year of the nutrient management plan;
- The end of a year in which, due to a change in the cropping system at the farm unit for there is a decrease of 20% or more in crop removal of nitrogen and phosphorus provided by the nutrients received since the first year of the nutrient management plan. The "Chart Showing Groups of Crops with Equivalent Crop Removals" will help to determine when this has occurred and this chart is being developed; or
- The end of a year in which there is a decrease in land available for the application of prescribed materials on the farm unit of more than 10%, amounting to a decrease of at least 2 hectares since the first year of the nutrient management plan.

7.2 *REQUIRED CONTENTS OF A NUTRIENT MANAGEMENT PLAN*

7.2.1 Farm Unit Information

A. Description of the Operation

The description should give the type of agricultural operation covered in this nutrient management plan (i.e. cash crop, greenhouse, etc). This brief summary of the farm unit should give the following information:

- Any unusual details or issues requiring additional explanation,
- Indicate if the nutrient management plan is new or a renewal, and
- Identify corresponding strategies by the operation Identifier.

B. Farm Unit Declaration Form

For an agricultural operation there is a required Farm Unit Declaration. It identifies the contact information for the farm unit operator and identifies the facilities and landbase associated with the operation. The Farm Unit Declaration is described in Part 2 of this protocol and can be completed using either the Farm Unit Declaration Form or generated using the farm unit Screen in NMAN.

C. Agreements

Agreements are necessary to demonstrate two types of events.

- an operation is, for a specified period of time, in control of a certain identified landbase,
- nutrients are being transferred from one operation to another, which results in a change in the quantity of nutrients that each operation must account for in their nutrient management strategy.

Agreements must be signed and attached to the nutrient management strategy. There are three types of agreements recognized by the regulations and they can be found in Part 16 of this protocol. They are

Type of Agreement	Details
Broker Agreement	A broker agreement represents either a transfer from a generator to a broker or a transfer from a broker to a receiver. Each party to the agreement needs a signed copy. The broker must have the identifier of each generator or receiver they have an agreement with.
Nutrient Transfer Agreement	This form indicates that nutrients are being transferred to or from an operation and implies that that the nutrient management strategy and/or plan of each operation reflects that transfer.
Manure /Biosolid Application Agreement	This agreement documents the provision to apply nutrients to land that is not owned by the operator of the operation doing the nutrient management strategy. This agreement implies that for the duration of the agreement the land covered by the agreement becomes part of the farm unit that is applying the nutrients. It is therefore also part of the farm unit Declaration of that farm unit.

D. Farm Unit Sketch

Maps or sketches can be hand drawn, photos, or computer generated. A farm unit operator may choose to do more than one sketch if it isn't possible to show the land belonging to the farm unit on one sketch or if there is too much information for one sketch. NMAN has placeholders for scanned images or links to picture files. Every map or sketch should be neat and readable and be presented with the direction north to the top of the page, denoted by a north arrow.

The sketch must address (either include or state that they don't' exist) the following items:

Location of all the landbase declared in the farm unit:

- Land that is owned or they have Manure/Biosolid Application Agreements for.

- Road names, municipality boundaries, neighbours, and other local features

Location of generation facilities and storage(s):
- Permanent, temporary and proposed generating facilities
- Permanent, temporary and proposed storage facilities
- Distance between facilities and distance to other buildings
- Dimensions of all facilities

Location of sensitive features:
- Known wells (includes gas, oil, test and water wells)
- Municipal wells
- Tile inlets
- Surface water (as defined in Part 9 of this Protocol)
- Residences and other designated health or educational facilitys (as defined in Part 9 of this Protocol)

7.2.2 Nutrient Information

F. Prescribed Materials Applied to Land in the Farm Unit
For all prescribed materials destined to be land applied on this farm unit, the nutrient management plan must include the following information.

- Type/name of the prescribed material
- Form of the prescribed material: liquid or solid (Solid prescribed materials contain less than 82% moisture or meet the requirement of the "Slump Test" as defined in EPA Regulation 347).
- Quantity of prescribed material.
- Nutrient Analysis of the prescribed material

And if received:
- Date it is received
- Identifier of the source of the prescribed material with the corresponding agreements.

Note: For farm units who are just users of nutrients (ie do not generate) the sum of the quantity(s) of prescribed material(s) to be land applied on the farm unit must be equal to the quantity of prescribed materials received on the farm unit that are destined for land application.

G. Nutrient Sampling and Analysis
All nutrient analyses are to be performed according to the Sampling and Analysis Protocol outlined in Part 14 of this Protocol.
- All prescribed materials must meet Nutrient Quality standards protocols (Part 13) to ensure they can be applied to agricultural land.
- All Commercial Fertilizers used in a nutrient management plan must identify the guaranteed N-P-K analysis of the formulation.
- The nitrogen, phosphorus and potassium content for all prescribed materials must be given.

- If a laboratory nutrient analysis is supplied for a prescribed material, then it must be completed within the last 5 years.
- The nutrient content of a laboratory nutrient analysis for manure must be within 30% of the NMAN data bank averages, or documentation must be included explaining the differences.

I. Storage Information
A list of all storage facilities on the farm unit must be compiled. If some or all of the nutrients are not stored on the farm then a written justification is necessary.

Nutrient storage facilities must comply with the regulations for capacity and siting. For each storage facility a description is require that gives the dimensions, capacity, type of storage (circular, rectangle, covered, open, etc.) and any other special features.

J. Contingency Plan
A written contingency plan is required as described in Part 11.

K. Certification Form
The certification form serves as a sign-off document for the farm unit operator, the person who prepared the plan, and the OMAF reviewer. See Part 16 on forms.

7.2.3 Field Information

A field can be broken down into sections to reflect individual management zones. Each field is considered to include at least one section. Components M – T must be included for every field section identified in the nutrient management plan. All land identified in the farm unit must be included in a field section.

L. Field Properties
The following field properties must be given in the nutrient management plan for each field identified in the farm unit:

1. The total tillable acreage for each field must be given.
2. The total tillable acres available for nutrient application must be given. Note: Determined by subtracting the area not available for nutrient application due to required setbacks from the total tillable acres for each field.
3. If field is within 500 feet of a surface water, then percent slope near the watercourse
4. If field is tile drained
5. Maximum field slope
6. If bedrock is less than 3 feet from the surface
7. Minimum depth to groundwater
8. If field has a minimum of 10 feet buffer strip already in place next to a surface water Soil Texture as described in NMAN
9. Soil Series as described in OMAF Publication 29

M. Field Sketch

Many of the Field Properties are required in the format of a sketch for each field in the farm unit. The sketch must address the following field components:

1. Field identifier/name (from Farm Unit Declaration)
2. Identity of sections within the field, the field has more than one section
3. Indicate presence of drainage tiles

As defined in Part 9 of this Protocol, Common Land Application Standards of this Protocol the following features must be included on the sketch:

4. Location of all Surface Water
5. Location of all Residential Areas and other Designated health or educational facilitys
6. Location of all wells within 100 feet of field boundary
7. Minimum Depth to Groundwater
8. Minimum Depth to Bedrock
9. Slopes within 500 feet of all surface water and any separation distances required due to the Phosphorus Index
10. Indicate adequate separation distances for items #3-5.

If any of the items listed do not exist for the field then the sketch must have a written comment to indicate that they are not present (e.g. "This field is not tiled.").

N. Soil Sampling and Analysis

All fields require a soil analysis to balance available nutrients. The analysis' are to be performed according to the Sampling and Analysis Protocol outlined in Part 14 at least once every 3 years. If biosolids are going to be applied to a field than the soil analysis must include an analysis of metals as required by the regulations.

7.2.4 Cropping Practices

O. Crop Rotation and Yields

The following information is required for each field in the nutrient management plan.

- Crop rotation for the duration of the nutrient management plan
- Expected planting and harvest dates
- Expected crop yields for the duration of the nutrient management plan
- Previous years crops and their yield

Yield Documentation for Continuous Cropping

Documentation supporting stated yields is required for fields where the same crop is grown continuously for 3 or more years on the same field and the estimated yield exceeds township averages.

Yield Documentation for High Yields

Documentation supporting stated yields is required for fields where the estimated crop yields exceeds 120% of the township average and/or provincial average. Crop insurance records and NISA statements are examples of suitable documentation

P. Tillage Practices
The following information must be included for all fields in the nutrient management plan.

- Tillage Method
- Tillage Practice
- Expected date of tillage
- Length of Slope

7.2.5 Nutrient Application

Q. Commercial Fertilizer Application
So far in the nutrient management plan Commercial Fertilizer application has not been addressed. All liquid and solid Commercial Fertilizer applied, for the entire duration of the nutrient management plan, must be identified. This includes but is not limited to: starter, pop-up, side-dressed, broadcast, banded, foliar, fertigated, incorporated or unincorporated applications.

For each application the expected date, rate and method is required as well as the ratio/mix of nutrients in the Commercial Fertilizer.

R. Application of Prescribed Materials and Limits
For each prescribed material listed in component G above – "Prescribed Materials Used on farm unit" the nutrient management plan must identify the following for the entire duration of the nutrient management plan:

- Prescribed Material Type and Form
- Expected application date
- Application method
- Timing to incorporation
- Application Frequency
- If nitrogen is expected to be applied in the fall after a crop is harvested

7.2.6 Nutrient Application Limits
The rate of application for each prescribed material is on a field (section) by field basis given the land application standards and the information already inputted about the field/section and the cropping practices.

S. Agronomic and Crop Removal Balance of Nitrogen

Agronomic Application Limits for Nitrogen
To determine the agronomic application limits for nitrogen to a field calculate the agronomic balance, and if applicable, calculate the N-Index to determine maximum allowable application rates for nitrogen.

The Agronomic Balance Calculation for Nitrogen

Agronomic Balance is the total available nitrogen from all applied sources, including all prescribed materials and commercial fertilizers, minus crop production requirements.

Agronomic Balance Calculation and Limits for Nitrogen are described in the Nutrient Management Workbook.

T. Nitrogen Index

The N-Index is a tool for limiting nitrate nitrogen movement below the root zone in agricultural fields. It assesses the vulnerability of nutrient management practices with respect to the movement of nitrates in groundwater. It is based on nutrient management practices and characteristics of the soil.

There are two triggers that require the completion of the N-Index:

- nitrogen is applied in excess of the agronomic balance
- nitrogen is applied in the fall after crop harvest

The N-Index calculation is a Four-Step Process and is described in the Nutrient Management Workbook.

U. Application Limits for Phosphorus

To determine the application limits for phosphorus to a field calculate the agronomic balance and if applicable the crop removal balance to determine the maximum allowable application rate of phosphorus to a field. If your soil test for phosphorus is greater than 30, calculate the P-Index to determine required separation distances from water sources.

The Agronomic Balance Calculation for Phosphorus

Agronomic Balance is the total available phosphorus from all applied sources minus crop production requirements. This calculation is described in the Nutrient Management Workbook.

V. Phosphorous Index

The P-Index must be completed for all fields that have a soil test phosphorus level greater than 30 ppm. The P-Index will determine separation distance requirements for phosphorus application from surface water.

The P-Index is a tool for limiting phosphorus movement into surface water from agricultural fields. This tool is to be used in the context of nutrient management planning. The P-Index can be completed using the Nutrient Management Workbook, the NMAN computer program developed by OMAF, or OMAF Factsheet 98-079.

W. Common Land Application Setback/Limits

The following land application standards must be considered to determine the application rate and land available for application in each field/section. The requirements for these are in the regulation and the definition of them is in Part 9 of this Protocol.

1. Liquid Loading Limits
2. Tile Drainage Monitoring

3. Setbacks from Wells
4. Setbacks from Surface Water
5. Setbacks from Designated health or educational facilities
6. Winter Spreading Limits
7. Bedrock and Groundwater Separation

7.2.7 Landbase Information

X. Demonstration of Adequate Landbase
The nutrient management plan must demonstrate that sufficient landbase exists for the application of all the nutrients identified that are being applied such that none of the allowable application limits are exceeded and all of the setbacks are met.

Complete Nutrient Management Plan
Only those parts of a nutrient management plan that are required to demonstrate compliance will need to be submitted for approval or kept on file. The nutrient management plan that would be available for inspection and submitted for approval or certification would include:

1. Certification Form
2. Agreements
3. Farm Unit Sketch
4. Field Sketches
5. Soil Test results
6. Contingency Plan
7. Any additional documentation required for the nutrient management plan (yield documentation)

8. Printouts from NMAN or workbook sections:

a) Farm Unit Information (declaration and identifier)
b) For each farm property a Farm Information sheet (location, roll #,generator or not, name)
c) Manure/Nutrient Source Summary
d) Manure/Nutrient Information (type, analysis etc)
e) Storage Information (Yearly amount, days of storage, amount remaining etc)
f) Manure/Nutrient Application Graph (tracks total (all types) amount remaining)
g) Manure/Nutrient Application Summary (for each field/section the rate, amount, method, setback)
h) Manure Storage Sizing calculations
i) Field Summary (field identifier, soil info, area, crop type, # of nutrient applications, flags)
j) Flag Summary (Flags are indicators of non-compliance or missing information)

8 Part 8 - Short Version NUTRIENT MANAGEMENT STRATEGY and NUTRIENT MANAGEMENT PLAN Criteria for Agricultural Operations

8.1 *GENERAL*

For category 1,2,5,7, and 8 farm units there is the possibility of preparing a short form nutrient management strategy and/or plan. However, if the operation is applying biosolids, this option is not available to them – a full nutrient management plan must be done and submitted to OMAF for review and approval. To do so the farm unit must be able to comply with every point in section 8.2. The operator of a farm unit with a short version nutrient management strategy or plan is not exempt or excused from following all the other requirements for farm units set out under the regulations of the Nutrient Management Act.

- Short Version nutrient management strategy/plan is based on a farm unit and must include a farm unit Declaration Form.
- Short Version nutrient management strategy/plan must be kept on the Farm and be available for reference and inspection purposes.
- Short Version nutrient management strategies/plans can be done as required by category phase in.

8.2 *CRITERIA/COMPONENTS OF A SHORT VERSION NUTRIENT MANAGEMENT STRATEGY AND/OR PLAN*

An operator must be able to answer "YES" to all of the questions below to satisfy the eligibility requirements for a Short Version nutrient management strategy/plan. If the operation can answer yes to all of the questions then this sheet of questions, when signed becomes the nutrient management strategy/plan for the operation. If the answer is "NO" to **any** of the questions, then a full nutrient management strategy and or nutrient management plan must be completed.

This is the short version for farmers generating or receiving manure. Short versions for category 5,7 and 8 will be developed.

Write the Operation Identifier here:	**Yes or No**
1. Does this farm unit have a completed farm unit Declaration and indicate the operation identifier?	
2. Does the operator of this farm unit have proof that a minimum level of education or training in Best Management Practices has been attained (to be defined)?	
3. Does this farm unit only use on-farm generated nutrients and/or commercial fertilizer farms and/or other materials specified for inclusion in the criteria for short	

version Nutrient Management Strategies/ Plans by the Director?	
4. This farm unit does not apply biosolids?	
Does this farm Generate Nutrients? If so complete question 5, if not go to question 6.	
5. This farm unit is a generator of manure. Does it...	
a) Belong in category 1or2?	
b) Manage only on-farm generated solid manure, including run-off from that manure?	
c) Generate less than 1.5 NU per tillable ha on the farm unit?	
d) Have a completed MSTOR or equivalent evaluation?	
e) Have one of the following: • a minimum of 240 days storage with run-off control or treatment, or • storage as above for the confinement period of livestock confined for less than 240 days, or • a Broker Agreement to compensate for storage capacity less than the required period, or • proof of an arrangement with an Intermediate Generator to compensate for the storage capacity less than the required period?	
Does this farm unit receive nutrients? If so complete question 6, if not go to question 7.	
6. This farm Unit is a receiver of manure and it... a) Receives less than 1.5 NU/ha?	
b) Meets all requirements for temporary storage?	
If this farm unit applies nutrients to land answer question 9, if it doesn't go to question 10.	
7. This farm unit applies nutrients to land. Does it...	
a) Only apply solid manure with application rates <7t/ha poultry manure or <22t/ha for other solid manure on all fields?	
b) Comply with all land application regulations (setbacks, adequate spreading conditions, etc.)?	
c) Apply nutrients to land at rates less than 15 kg/ha above OMAF Crop Fertilizer Recommendations?	
8. Does the farm unit have a contingency plan completed that follows the guidelines set out in this Protocol?	
9. Will you reassess your farm unit based on this set of criteria at least every 5 years and renew your nutrient management strategy/plan accordingly?	
10. Is the operator of this farm unit free from violation under the Nutrient Management Act within the last five years?	
Signature of Operator	**Date**

9 Part 9 - Common Land Application Protocols

The regulations for land application of nutrients determine when spreading may occur, and under what conditions it is appropriate. The rate of application is dependent on individual site characteristics. Requirements with respect to sensitive features, setbacks and times when no application can occur are given in the regulations, with the following expanded guidelines. Unless a phase-in is specified in the regulation, these requirements come into effect as soon as the regulation is filed.

9.1 *APPLICATION RATES FOR LIQUID PRESCRIBED MATERIALS*

Liquid materials should not be applied at rates where the material would run off the application site. The maximum application rate is defined by the runoff potential of the site, which in turn depends on the field slope and the permeability of the soil. The risk of runoff is much greater from a sloping field than from a level one, and from a clay soil than from a gravelly soil. These relations are described in the following tables.

9.1.1 Single Application Liquid Loading Limit

Runoff potential (see Table 2)	Maximum application rate if applied to the surface of land	Maximum application rate if injected, incorporated[1] after application or applied to pretilled[2] land
High	50 m^3/ha	75 m^3/ha
Moderate	75 m^3/ha	100 m^3/ha
Low	100 m^3/ha	130 m^3/ha
Very Low	130 m^3/ha	150 m^3/ha

[1] Incorporation must occur within 24 hours of manure application.
[2] Pretillage must have occurred no more than 7 days prior to manure application.

9.1.2 Runoff Potential

Soil hydrologic group (see Ontario Ministry of Agriculture and Food Ontario Drainage Guide)	Maximum sustained field slope within 150 m of watercourse			
	< 3 %	3 - 6 %	6 – 9 %	9 – 12 %
A (Rapid)	Very Low	Very Low	Low	High
B (Moderate)	Very Low	Low	Moderate	High
C (Slow)	Low	Moderate	High	No Application
D (Very Slow)	Moderate	High	High	No Application

Application of liquid prescribed materials is not allowed on land with slope greater than 12%.

Note: Slope as a percentage is another way of expressing rise over run. Ie 12/100 is 12%

9.2 *LAND WITH TILE DRAINAGE*

When liquid materials are applied to land with tile drainage, the quality of the tile water leaving the field must be monitored, if possible. If it is not possible to monitor the tile water, then either the field must be pre-tilled within seven days before manure application, or the application rate must be below 40 cubic meters per hectare.

There must also be a contingency plan for liquid application on land which is tile drained. When monitoring demonstrates that liquid prescribed materials are in the tile, then the contingency plan must be implemented. This plan must outline the actions required to stop the release from the tile, and either contain the contaminated water or direct it to an area for treatment or absorption into the soil.

9.3 *SETBACKS*

9.3.1 Setbacks from Private Wells

The construction and siting standards for wells are covered under Regulation 903 of the Ontario Water Resources Act. In addition, setbacks for the land application of nutrients are specified in the Regulation to the Nutrient Management Act. The definition of wells in the regulation includes water wells, oil wells, gas wells and test wells.

9.3.2 Setbacks from Municipal Wells

Because of the greater exposure to water drawn from a municipal well than from a private well, there are more stringent limitations to land application near a municipal well. No nutrients are to be applied within 100 meters of any municipal well. In addition, within the two year time of travel zone to a municipal well, the soil must be pretilled before the application of liquid prescribed materials, or the rate of application must be less than 40 cubic meters per hectare. The rate of nitrogen application will be limited by the nitrogen index. For this purpose, the soils within the two year time of travel zone will be treated as if the hydrologic soil group were one category higher (that is, a "B" soil would be treated as if it were an "A" soil) than the category defined for the soil type in that area.

9.3.3 Setback from Surface Water

The minimum setback from the top of the bank adjacent to surface water is defined in the regulation. There may be wider setbacks required in the nutrient management plan by the Phosphorus Index or the material application rate, in which case the wider setbacks would take precedence.

"Surface Water" is defined as:

a natural or artificial channel that carries water continuously or intermittently throughout the year, and if intermittently has established vegetation within the bed of the channel that is not dominated by terrestrial plants. It also includes lakes, reservoirs, ponds, sinkholes, or wetlands. It does not include grassed waterways, temporary channels for surface drainage (furrows or shallow channels that can be tilled and driven through), rock chutes and spillways, roadside ditches (not meeting the definition for a continuous or intermittent stream) or temporarily ponded areas that are normally farmed.

"Wetland" is defined as land such as a swamp, marsh, bog or fen (not including land that is being used for agricultural purposes and no longer exhibits wetland characteristics) that,

(a) is seasonally or permanently covered by shallow water or has the water table close to or at the surface,

(b) has hydric soils and vegetation dominated by hydrophytic or water-tolerant plants, and

(c) has been further identified, by the Ministry of Natural Resources or by any other person, according to evaluation procedures established by the Ministry of Natural Resources, as amended from time to time.

"Terrestrial plants" are defined as those species that are not hydrophytic. They would normally occupy lands that are not subject to inundation for more than short periods.

"Top of bank" is defined as the edge of a defined channel where there is a sharp change from the steep slope of the channel to the shallower slope of the field area; or where no such break in slope exists, the normal bank-full extent of the watercourse when it is carrying the maximum volume of water without flooding.

9.3.4 Setback from Residences and Designated Health or Educational Facilities

Setbacks from residences or designated health or educational facilities are specified in the regulations. Setbacks are measured from the nearest wall of a residence, or from the property line of a designated health or educational facility.

Definition of Residential Area: Four or more residential buildings on adjacent lots, generally one hectare or less in size sharing a common boundary. Lots located directly across the road from one another are considered as having a common boundary.

The definition of a "designated health or educational facility" is taken from Ontario Regulation 505/01, under the *Ontario Water Resources Act*, with the exception that it does not include land used for a school while the school is not in session. The definition does include:

- a delivery agent care facility,
- a health care facility,
- a school or private school, during that time of year when the school is in session
- a social care facility,

- a university, a college of applied arts and technology, or an institution with authority to grant degrees;

"day nursery" means a day nursery as defined in the *Day Nurseries Act*;

"delivery agent care facility" means,
- a place where an emergency hostel service that receives funding under the *Ontario Works Act, 1997* is provided,
- a domiciliary hostel that receives funding under the *Ministry of Community and Social Services Act*,
- a place where a resource centre program that receives funding under the *Day Nurseries Act* is provided, or
- a place where a recreational program that receives funding under the *Day Nurseries Act* is provided;

"health care facility" means a facility that provides overnight accommodation and that is,
- a hospital within the meaning of the *Public Hospitals Act* or the *Community Psychiatric Hospitals Act*,
- a private hospital within the meaning of the *Private Hospitals Act*,
- a psychiatric facility within the meaning of the *Mental Health Act*,
- a nursing home within the meaning of the *Nursing Homes Act*,
- a home within the meaning of the *Homes for the Aged and Rest Homes Act*,
- an approved charitable institution within the meaning of the *Charitable Institutions Act* that is approved under section 3 of that Act as,
- a halfway house where rehabilitative residential group care may be provided for adult persons,
- a home for the aged, or
- a home where residential group care may be provided for handicapped or convalescent adult persons,
- a cancer centre established by the Ontario Cancer Treatment and Research Foundation under the *Cancer Act*,
- a home for special care within the meaning of the *Homes for Special Care Act*,
- an approved home within the meaning of the *Mental Hospitals Act*,
- a commercially operated residence for seniors or retired persons, or any other similar commercially operated residence, where attainment of a mature age is a factor in being accepted for occupancy,
- a nursing station, health centre, clinic or other facility that receives funding through the Ministry of Health and Long-Term Care's Underserviced Area Program, or
- a facility owned or leased by a person who receives funding from the Ministry of Health and Long-Term Care for one or more of the following health care support services that are provided to or are available to residents of the facility:
- a residential treatment services program,
- a withdrawal management services program,
- a dedicated supportive housing project;

"private school" means a private school as defined in the *Education Act*;

"school" means a school as defined in the *Education Act*;

"social care facility" means,
- a facility designated by the regulations under the *Developmental Services Act* as a facility to which that Act applies,
- a residence licensed as a children's residence under the *Child and Family Services Act*,
- a facility where child development services, child treatment services, child welfare services, community support services or young offenders services, within the meaning of the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a facility where child and family intervention services, within the meaning of Regulation 70 of the Revised Regulations of Ontario, 1990 made under the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a place where an emergency shelter service that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a day nursery,
- a sheltered workshop that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act*,
- a place where a supported employment program that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act* is provided,

- a place where an adults' community support service that receives funding under the *Developmental Services Act* is provided, unless the place is located in a private residence,
- a place where an employment preparation, training and job placement program that receives funding under the *Developmental Services Act* or the *Ontario Disability Support Program Act, 1997* is provided,
- a place where a violence against women program that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a place where an aboriginal healing and wellness program is provided;

"school" means a school as defined in the *Education Act*;

"social care facility" means,
- a facility designated by the regulations under the *Developmental Services Act* as a facility to which that Act applies,
- a residence licensed as a children's residence under the *Child and Family Services Act*,
- a facility where child development services, child treatment services, child welfare services, community support services or young offenders services, within the meaning of the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a facility where child and family intervention services, within the meaning of Regulation 70 of the Revised Regulations of Ontario, 1990 made under the *Child and Family Services Act*, are provided, unless the facility is located in a private residence,
- a place where an emergency shelter service that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a day nursery,
- a sheltered workshop that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act*,
- a place where a supported employment program that receives funding under the *Developmental Services Act* or the *Ministry of Community and Social Services Act* is provided,
- a place where an adults' community support service that receives funding under the *Developmental Services Act* is provided, unless the place is located in a private residence,
- a place where an employment preparation, training and job placement program that receives funding under the *Developmental Services Act* or the *Ontario Disability Support Program Act, 1997* is provided,
- a place where a violence against women program that receives funding under the *Ministry of Community and Social Services Act* is provided, unless the place is located in a private residence,
- a place where an aboriginal healing and wellness program is provided;

9.4 *WINTER APPLICATION*

Application of nutrients during the winter is undesirable because there is no growing crop to absorb the applied nutrients, and there are often conditions that could lead to the runoff of applied materials into surface water. Restrictions to the application of nutrients during the winter are outlined in the regulation.

9.5 *BUFFER ZONES*

Permanent vegetation in a buffer zone adjacent to surface water slows down the movement of runoff into surface water, filters out sediment and other particulate matter, and absorbs nutrients that would otherwise enter the surface water. These will all have a positive effect on surface water quality. The regulations require that all surface water be bordered by a vegetated buffer zone with a minimum width of three meters, measured from the top of the bank. This requirement is phased in, so that a farmer is required to have vegetated buffer zones at the same time as he is required to complete a

nutrient management plan. Until the buffer is established, nutrient applications are subject to a wider setback from surface water.

Definition of Vegetated Buffer Zone
For the purposes of this regulation, a vegetated buffer zone is defined as an area that is maintained under continuous vegetated cover (perennial grasses, forbs or trees, including perennial forage crops that are harvested as hay or silage), adjacent to surface water sources.

9.6 *BEDROCK AND GROUNDWATER*

9.6.1 Minimum Depth to Bedrock

Fractured bedrock is present under most of Ontario's farmland. The overburden normally provides filtering of contaminants before it reaches this depth, but there are areas where the thickness of the overburden is not sufficient to provide this protection. Contaminants that reach the bedrock can move downward into an aquifer with no restriction. Limits to the application of prescribed materials help to minimize this risk.

Application of non-agricultural source materials is not allowed on land with less than 1.5 meters of soil over bedrock, unless approved by the director of MOE.

Application of manure and other agriculture source material is allowed, subject to the limitations outlined in the regulation. The limits are applied relative to the shallowest soils over bedrock in the area of application.

9.6.2 Minimum Depth to Groundwater

Definition of Permanent Water Table: The shallowest zone in the soil which normally has positive water pressure, as recorded in the water well records for the nearest water well, or as determined by a test hole dug during the summer months.

"Unsaturated soil condition" can be tested by digging a hole or removing a soil core to a 30 cm depth, and observing whether water flows into the hole from the surrounding soil. Water will only flow under saturated conditions, so if water is observed the soil does not meet the criteria for nutrient application.

9.7 *PRE-HARVEST WAITING PERIOD*

Restrictions on the harvest of various crops following the application of non-agriculture source materials are listed in the regulation.

The food industry is very conscious of food safety, and has been very pro-active in specifying the minimum periods between manure application and harvest for food crops. They will not buy produce that does not meet their criteria. This is a more effective deterrent than any regulation.

9.8 *INCORPORATION REQUIREMENTS BASED ON ODOUR CRITERIA*

The incorporation requirements for prescribed materials, based on how odourous the material is, and the distance to a residence or designated health or educational facility, are listed in chart below. Additional requirements for municipal biosolids are set out in the regulation.

This chart applies to all prescribed materials other than municipal biosolids.

Material Odour Rating	Distance to Residence or Residential Area		
	<25 M to single residence <50 m to residential area or designated health or educational facility	25 to 90 m to single residence 50 to 450 m to residential area or designated health or educational facility	> 90 m to single residence > 450 m to residential area or designated health or educational facility
O1	No application	Incorporation recommended, except on hay or pasture	No restrictions
O2	No application	Incorporation required within 24 hours of application	Incorporation recommended, except on hay or pasture
O3*	No application	Incorporation required within 6 hours of application. Direct incorporation or injection recommended.	Incorporation required within 24 hours of application.* Direct incorporation or injection recommended.
*High Odour materials may be spread on pasture or hayland where techniques that ensure the manure is placed below the vegetative cover are employed (e.g., low-pressure ground level application, sleigh foot applicator, etc). Separation distances from residences, residential areas and high conflict land uses apply.			

Note: Odour Criteria are described in Part 14.8 of this Protocol.

10 Part 10 – Outdoor Livestock Feeding Operations

10.1 CLASSIFICATION OF OUTDOOR LIVESTOCK FEEDING OPERATIONS

Outdoor feeding operations are classified as either seasonal or permanent. Both seasonal and permanent operations are further classified as either high density or low density based on a simple body count as follows:

Seasonal (less than 200 days of the year in confinement area)

High density: More than 5 Nutrient Units per hectare per year (NU/ha/yr).

Low density: 5 or less Nutrient Units per hectare per year (Nu/ha/yr).

Permanent (200 days of the year or more in confinement area)

High density: 0.012 or more Nutrient Units per metre squared (NU/m^2).

Low density: less than 0.012 Nutrient Units per metre squared (NU/m^2).

New and Expanding for an outdoor livestock feeding operation is defined as an increase of 20% in either:

- number of animals (or equivalent in NU)
- amount of manure produced
- the animal density

over the course of one production year that is not reflected in an approved nutrient management strategy

10.1.1 Seasonal: Annualization of Nutrient Units per Hectare

Nutrient units per hectare per year will represent animal density for **seasonal** outdoor feeding operations. It is a method for determining nutrient deposition that is based on the duration that the livestock is present. The total nutrient units per hectare are calculated using the appropriate NU values for the livestock from the tables in Part 3 of this protocol. This value is then adjusted to adequately reflect how long the livestock was actually on those hectares.

Example of Low Density

One hundred beef cows are wintered on a field of 10 hectares for 120 days. From the NU table it is determined that 1 beef cow equals 1 NU.

100 beef cows = 100 NU

so: 100 NU is on 10 ha which = 10 NU/ha

120 days is approximately 1/3 or (33%) of a year, therefore, the NU loading for this field over the course of this year (provided that there is no other period of the year that livestock is present) is:

10 NU/ha x .33 = 3.3 NU/ha/yr

3.3 NU/ha/yr is less than 5 NU/ha/yr so this is a low-density seasonal feeding operation this year.

Example of High Density

Three hundred ewes (meat sheep) are wintered on a field of 2 hectares for 180 days. From the NU table it is determined that 8 ewes equal 1 NU.

300 ewes / 8 ewes per NU = 37.5 NU
so: 37.5 NU is on 2 ha which = 18.75 NU/ha

200 days is approximately 49% of a year, therefore, the NU loading for this field over the course of this year (provided that there is no other period of the year that livestock is present) is:

18.75 NU/ha x .49 = 9.2 NU/ha/yr

9.2 NU/ha/yr is more than 5 NU/ha/yr so this is a high-density seasonal feeding area this year.

10.1.2 Permanent: Nutrient Units per Square Metre

Example of low density

100 beef cows are kept on 1 hectare for 250 days. From the NU table it is determined that 1 beef cow equals 1 NU so there are 100 NU per ha.

One hectare equals 10,000 m2 so...

100 NU/ha equals 0.010 NU / m2 which is less than 0.012 so this is a low-density permanent outdoor feeding area.

Example of high density

450 beef feeders are kept on 1 ha for 250 days. From the NU table it is determined that 3 beef feeders equal 1 NU so there are 150 NU per ha.

One hectare equals 10,000 m2 so...

150 NU/ha equals 0.015 NU/ha, which is more than 0.012 so this is a high-density permanent outdoor feeding area.

10.2 STORAGE

The floor of an outdoor livestock confinement area is considered to be a manure storage. This is reflected in the siting requirements for the different outdoor livestock confinement area classes, such as the requirements for specified soil type and depth. Furthermore, no additional storage should be needed provided that manure is land applied directly from the outdoor livestock confinement area according to a nutrient management plan.

If manure is removed from that floor before being land applied (according to a nutrient management plan) then the storage where it is kept must also meet the requirements for construction and siting of storage facilities.

Minimum Distance of Separation and Spatial Separation

For seasonal outdoor livestock confinement areas, static minimum measurements by operation category are detailed in the regulation, as are spatial separation distances to specific features such as wells.

For permanent outdoor livestock confinement areas, the regulations for manure storage siting apply. This relates to all spatial separation from features such as wells and tiles, as well as the application of the MDS II formula for odour purposes. This distance calculated for the operation by MDS II will be measured from any areas that livestock are routinely confined such as pens, to the conflicting land use such as residences.

11 Part 11 – Contingency Planning

11.1 *GENERAL*

The contingency plan is drawn up in advance so that they can be implemented on short notice. They are a required component of both nutrient management strategies and plans and must be tailored to that particular operation's conditions. Key people in every operation should be familiar with the contingency plan and how to implement it.

Contingency plans should detail and outline the equipment that is available if and when a spill should occur (i.e. loader tractors, emergency storage trailers, etc). They must also include emergency contacts, such as the owner/operator (who can authorize expenditures), The Spills Action Centre, at 1-800-268-6060, and the local municipality (who can be contacted for drainage information and for assistance in spill response). The 911 address or specific lot and concession of the farm unit should also be known, in order to assist emergency personnel attending the scene.

Emergency and first aid equipment should be listed-i.e. fire extinguishers, hoses and outside water taps, sand or other absorbents.

Location of sensitive storage areas should be known in the event of a fire, such as fuel storage and pesticide/fertilizer storage. The local fire department or fire prevention office can assist with this.

All contingency plans enacted may involve a significant change to either your nutrient management strategy or plan in which case you should refer to Part 5 and 7 of this Protocol on updating these documents.

When the situation requiring the use of the contingency plan is taken care of, re-evaluate your contingency plan to determine what improvements are needed, and what you were not prepared for and make changes accordingly.

When the implementation of a contingency plan causes you to change any aspect of your nutrient management strategy or plan then it is important to assess the significance of the change and determine whether or not a renewal is necessary.

11.2 *MORE NUTRIENT THAN THE NUTRIENT MANAGEMENT STRATEGY OR PLAN HAVE BEEN PREPARED TO DEAL WITH*

1. If the application rates for nutrients in your nutrient management plan are not at their maximum you can review the nutrient management plan and try to increase the application rate and maybe frequency for certain fields/sections. Any changes to the nutrient management plan must be

recorded to reflect the actual amount of nutrient applied. In some cases this may mean a renewal of the nutrient management plan is necessary.

2. If the application rates for nutrients in your nutrient management plan are at the maximum then the operation must be prepared to set up alternate uses for the nutrient. Possibilities include:

- Find a broker who can take it and complete a Broker Agreement
- Find an intermediate generator who will accept it
- Acquire more land through ownership or Manure/Biosolid Application Agreement
- Non-agricultural operators may consider other disposal methods such as landfill, composting, incineration or other processing methods.

11.3 *MORE NUTRIENT THAN THE STORAGE CAPACITY WAS DESIGNED FOR*

In some cases generally due to adverse weather conditions, manure storages may be in danger of overtopping. The preferred solution is to land apply the manure where environmental issues will not be a concern. Other spreading sites should be located either by:

- Renewing your nutrient management plan if you have one and if the application rates are not already at the maximum, or
- Transferring the nutrient to another storage with excess capacity, or
- Find a broker who can take it and complete a Broker Agreement
- Find an Intermediate Generator who will accept it
- Acquire more land through ownership or Manure/Biosolid Application Agreement
- Non-agricultural operators may consider other disposal methods such as landfill, composting, incineration or other processing methods.

11.4 *AGRICULTURAL OPERATION: UNANTICIPATED RELEASE OF NUTRIENTS FOR EXAMPLE SPILLS, BREAK IN EQUIPMENT OR STORAGE*

This is an important contingency plan due to the direct environmental problems that can occur when a spill takes place. It must outline the required equipment, contacts and safety precautions.
The idea is to minimize the potential for a spill and if one does occur to ensure that the operator of the operations and the employees know what actions to take.

To Avoid A Spill
Calibrate your nutrient application equipment each year so that you have an estimate of what rate you are applying and how to adjust that rate to meet the recommendations set out in this plan.
Avoid spreading closer than 30 feet to a surface water source. Increase this distance if indicated by the P-index calculation.
Mark all tile outlets and catch basins for nutrient application and or inspection purposes.
Monitor all tile outlets for at least 24 hours during and after applications and supervise all operations for possible quick shutdown. Carry phones in your tractors and have someone assigned to do odd

jobs around the pump at the storage tank on spreading days so that they may be called for quick shut off of the pump.
Till the soil prior to application to break it up and to increase soil absorption when necessary.
Do not spread on the steep part of the field by surface water sources and avoid winter spreading on frozen ground or before rain events.

To Clean Up A Spill
Immediately stop the cause of the spill if possible:
Shut down the appropriate pumps and valves
Make sure the system cannot be restarted

Then contact the 24 hour Spills Action Centre at 1-800-268-6060 or your local Ontario Ministry of Environment office.

To Contain the Spill
If the spill gets into a tile drain, plug the tile at its outlet and pump the liquids from the tile to a field.
If the spill is moving over the ground surface, an earthen berm would be built with farm or commercial equipment such as backhoes or dump trucks.
Notify downstream users.

To Clean Up the Spill
Spread the nutrient according to your nutrient management plan or put it in an adequate nutrient storage for later application.

The following contacts are to be posted by all phones for immediate access in case of a spill:
- Spills Action Centre
- Local Ontario Ministry of Environment
- Bulldozer/Backhoe Operator
- Municipality
- Neighbours

Drainage Tile Monitoring
For application of nutrients to land that is tile drained, monitoring of that tile drain is required. In the event that contamination of the flow in the tile drain is found during monitoring there should be a plan for isolating that tile flow.

11.5 *WEATHER OR EQUIPMENT CONDITIONS IMPEDE PLANNED STORAGE OR APPLICATION*

Timing Change
When the timing of the manure application must be changed, adjust nutrient amounts to reflect the change in timing. Do not exceed the maximum annual nutrient application rate or the maximum volumetric rate per application.

Record the change in your nutrient management plan and adjust subsequent applications of nutrients to account for the change in timing of the nutrient application.

Crop Change

Nutrient amounts and formulation (where possible) should be adjusted to account for the change in crop. If the nutrients are already applied, the amount and formulation (where possible) is adjusted for the next crop and to account for the previous crop change.

Commercial Fertilizer Blend Change

Where the nutrient composition that is listed in the nutrient management plan is altered, then the altered formulation must meet the NMAN nutrient requirements. Subsequent nutrient applications must reflect the changes to the original nutrient management plan.

12 Part 12 - Brokers

A broker is a person who transfers nutrients (liquid or solid) from a generator to a receiver.

A broker must complete the Broker Agreement Form with each generator they take nutrients from and every receiver they take nutrients to. This form is found in part 16 of this Protocol. A copy of Broker Agreement must be held by each of the two parties involved in the transfer (i.e. Broker and Generator or Broker and Receiver).

13 Part 13 - Haulers

A hauler is a person who transfers non-agricultural nutrient materials (liquid or solid) from a generator to a receiver.

A hauler must acquire a system C of A to transport non-agricultural prescribed materials (biosolids), until such time that certification is required and obtained. They are responsible for providing to the generator, a list of land application sites and the corresponding NMP identifier numbers assigned by OMAF or the site C of A numbers. They must report annually all sites they delivered to and land applied non-agricultural materials and associated volumes. This annual report must be kept until such time that OMAF or MOE staff requires it.

14 Part 14 - Nutrient Quality

14.1 *MINMUM BENEFICIAL QUALITY REQUIREMENT*

All non-agricultural source prescribed materials must meet one of the following three conditions for permission to be land applied.

Condition 1

The material must have a "Multiple Index of Enhanced Value (MIEV)" greater than or equal to 1

MIEV = (% dry matter/100) x (% organic matter, dry weight)/15 + (% CCE, dry weight/25) + (% N + % $P_2O_5^-$ + % K_2O^-, dry weight)/2

CCE = calcium carbonates equivalent, dry weight
N = total kjeldahl nitrogen

Condition 2

The prescribed material has been proven, by a qualified researcher or recognized research facility, to improve soil quality or productivity or plant quality or growth in a statistically significant way under actual or comparable Ontario environmental conditions.

Condition 3

A liquid material can be applied to growing crops and only during the normally dry period in the summer.

The Ministry can require generator of a non-agricultural source prescribed material to submit data to show that the prescribed material meets one of the three conditions stated in paragraph 14.1, prior to the application of the material.

14.2 *SODIUM*

The Ministry can require generators of all non-agricultural source prescribed materials to provide sodium concentration in the material and/ or in the soil, prior to the application of the material.

The application rate of the material shall not result in an exceedance of the maximum permissible sodium addition specified in the following table.

Soil Texture	Maximum permissible sodium addition (kg/ha/year)
Sands, sandy loams	200

Organic soils, loams, clay loams and clays	500

14.3 *PH*

Non-agricultural prescribed materials with pH less than 6.0 or pH greater than 8.5, cannot be surface applied to growing crops.

14.4 *BORON*

The Ministry can require generators of all non-agricultural prescribed materials to provide boron concentration in the material and/ or in the soil, prior to the application of the material.

The application rate of the material shall not result in an exceedance of the maximum permissible boron addition specified in the following table.

Crop	Maximum permissible boron addition
Boron intolerant crops	1 kg boron/ha/year if the hot water soluble boron concentration in the soil does not exceed 1.0 mg/kg of soil, d.w.
Boron tolerant crops	2 kg boron/ha/year if the hot water soluble boron concentration in the soil does not exceed 1.5 mg/kg of soil, d.w.

14.5 *FATS, OILS, AND GREASES*

The Ministry can require all non-agricultural source prescribed materials to provide fats, oils and greases concentrations in the material, prior to the application of the material.

The application rate of the material shall not result in an excess of the maximum permissible fats, oils and greases addition specified in the following table.

Soil	Maximum permissible addition of fats, oils and greases
Clay and clay loam	2500 kg/ha/year
Sand, loam and sandy loam	5000 kg/ha/year

14.6 *NON-BIODEGRADABLE OBJECTS*

The Ministry can require generators of all non-agricultural source prescribed materials to provide concentration of foreign non-biodegradable objects such as but not limited to glass, metals, plastics, prior to application of the material.

The foreign non-biodegradable objects that do not pass through an 8 mesh screen size Tyler sieve (2.36 mm size openings) shall meet the following conditions :

The concentration measured in "% dry weight" of plastic objects shall not exceed 0.5% of the total sample; and

The concentration measured in "% dry weight" of foreign non-biodegradable objects other than plastics shall not exceed 2% of the total sample.

14.7 *OTHER PARAMETERS*

The Ministry can require generators of all non-agricultural source prescribed materials to provide data for other parameters and meet additional site management practices, concentration and /or loading standards.

14.8 *TREATMENT PROCESSES FOR NON-AGRICULTURAL MATERIAL PRESCRIBED UNDER PARAGRAPH 1.7 (1) 3*

Treatment process options

Option 1: Anaerobic Digestion Designed and operated in accordance with the conditions set out in Section 16.2 "Anaerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time. Follow the requirements for Option 6 if the anaerobic digestion process does not meet the conditions set out in Section 16.2 "Anaerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time.
Option 2: Aerobic Digestion Designed and operated in accordance with the conditions set out in Section 16.3 "Aerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time. Follow the requirements for Option 6 if the aerobic digestion process does not meet the conditions set out in Section 16.3 "Aerobic Digestion" of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time.
Option 3: Long Term Storage Material[1] which had been stored for more than 3 months after the storage facility had received the last batch of material for treatment. Sediments withdrawn from waste stabilization ponds which were designed and operated in accordance with the conditions set out in Section 19 of the Ontario Ministry of Environment publication entitled "Guidelines for the Design of Sewage Treatment Works, July 1984", as amended from time to time, and the waste stabilization pond has not received fresh raw sewage for 3 months or longer. Follow Option 6, if the above stated conditions cannot be met.
Option 4: Composting

Material which has been treated by in-vessel, or static aerated pile or windrow composting method and the temperature of the material is raised to 40°C or higher and the material is maintained at this temperature for 5 days or longer, and for at least 4 hours during the 5-day period, the temperature in the compost pile exceeds 55 °C. Follow Option 6, if the composting facility does not meet the above stated conditions.
Option 5: Lime Stabilization Sufficient lime was added to the material to raise the pH of the material to 12 after 2 hours of contact. Follow Option 6 if the lime stabilization process does not meet the above stated conditions.
Option 6: Air Drying Materials are dried on sand beds or paved or unpaved basins for a minimum of 3 months. During 2 of the 3 months, the ambient average daily temperature is above 0°C.
Option 7: Other processes To be approved by the Ministry under the Ontario Water Resources Act or Environmental Protection Act, on a case-by-case basis. The approval may increase the frequency set out in Section 9.20 of the regulation for "Sampling, Analysis and Quality Standards for Land-Applied Materials".

[1] For the purpose of this Table, material means non-agricultural source material prescribed under Paragraph 1.7(1)3

14.9 *ODOUR STANDARDS FOR ALL PRESCRIBED MATERIALS*

All prescribed materials are classified into one of 3 odour categories O1 (Low Odour), O2 (Moderate Odour) and O3 (High Odour) as per the following Odour Category Table.

Odour Category Table

Odour Category	Prescribed Materials
O1 (Low Odour) Materials that have an odour which is less intensive than solid dairy cattle manure.	Agricultural lime
	Bark
	Cement kiln dust
	Chemical fertilizers
	Leaves
	Lime mud
	Magnesium residuals
	Matured fertilizing residuals compost
	Matured manure compost
	Paper biosolids with Carbon/Nitrogen >= 70
	Wood ash
	Wood chips
O2 (Moderate Odour) Materials that have an odour that is similar to solid dairy cattle manure	Acid treated paper biosolids
	Beef cattle manure
	Broiler manure
	Solid Dairy Cattle manure
	Immature manure compost

O3 (High Odour) Materials that is more intense than cattle manure but equal to or less than liquid hog manure	Abattoir waste and wastewater
	Grass clippings
	Liquid, beef cattle manure
	Liquid, dairy cattle manure
	Liquid, laying hen manure
	Liquid, milk calf manure
	Liquid, hog manure
	Milkhouse wastewater
	Milk wastes
	Sewage biosolids
	Non-acid treated paper biosolids with Carbon/Nitrogen ratio <70
	Paper biosolids that have been stored for more than 30 days before application
	Potato wastes
	Whey

The Ministry can add prescribed materials to or change the odour category of a prescribed material listed in the above Odour Category Table, from time to time.

The Ministry can change the odour category of a prescribed material based on actual data provided by the generator.

The Ministry can change the odour category of a prescribed material based on actual data provided by the public or obtained by the Ministry.

The Ministry can assign the odour category of a prescribed material if the material is not listed in the above Odour Category Table.

Generators of all prescribed materials must follow site management practices set out in the Table entitled "Incorporation Requirements Based on Odour Criteria in Part 9 of this protocol.

14.10 *BLENDING OF NON-AGRICULTURAL SOURCE PRESCRIBED MATERIALS*

The Ministry can allow generators to blend non-agricultural source prescribed materials prior to land application.

Both individual non-agricultural source prescribed materials to be blended and the blended mixture must meet the metals standards specified in the nutrient quality regulation.

The blended mixture must meet the applicable requirements specified in this protocol.

The blended mixture will be assigned an odour category based on the highest odour category of its individual material.

The Ministry can change the odour category of a blended material based on actual data provided by the generator.

15 Part 15 - Sampling and Analysis Protocol

15.1 *SAMPLING*

Methods for sampling soil or nutrient containing materials are published in the *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land*, and in the OMAF crop recommendation publications. Updated descriptions of the methods will be included in an OMAF/MOE Sampling and Analysis Document (under development), as amended from time to time.

15.2 *ANALYSIS*

Analysis for available nutrients in Soil shall be carried out by an OMAF accredited soil test lab, and using methods approved by the Ontario Soil Management Research and Services Committee

Analysis for available nutrients in Nutrient solutions and Growing Media shall be carried out by an OMAF accredited soil test lab, and using methods approved by the Ontario Soil Management Research and Services Committee

Analysis for nutrients in Prescribed Materials shall be carried out using methods consistent with analytical methods identified as being suitable by OMAF and MOE. These are currently listed in the *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land.* Updated information will be published in an OMAF/MOE Sampling and Analysis Document (under development), as amended from time to time.

Analysis for Other Criteria, as identified in the regulations, shall be carried out using methods consistent with analytical methods identified as being suitable by OMAF and MOE, and currently listed in the *Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land.* Updated information will be published in an OMAF/MOE Sampling and Analysis Document (under development), as amended from time to time.

16 Part 16 - Record Keeping

16.1 *ACTIVITY LOG REQUIREMENT*

The activity log will be used to keep a record of actual events and details. They must be made available for inspection purposes and therefore have to be kept on the farm unit or in a nearby place that is accessible by the farm unit operator 24 hours a day. A director may order that records must be held indefinitely.

The Activity Log is an effective tool to demonstrate the implementation of the nutrient management strategy or plan. Keeping adequate records also provides valuable benchmark information for the farm unit to indicate when a significant change has occurred that may require renewal of the nutrient management strategy or plan.

16.2 *CONTENTS OF AN ACTIVITY LOG*

The **actual:**

Cropping Practices
Crop type and planting date
1. Tillage method and date
2. Weather conditions around application and incorporation dates
3. Date and times of tile outlet monitoring including observations(on application dates)
4. Commercial fertilizer bills
5. Incorporation method and date
6. Harvest date
7. Yield

Application Practices:
1. For winter spreading: date, time, location, quantity, setbacks and reason for winter spreading
2. Nutrients types applied and application dates, rates, and methods
3. Nutrient quantities in storage

Livestock Information:
1. Livestock purchases
2. Livestock sales
3. Feed records

Other Required Information:
1. Documentation of any other time/conditions when a contingency plan is utilized. Including location, estimated volumes and remediation measures
2. What was done to resolve any written complaints

3. A copy of all inspection related recommendations and implementation of them.
4. Imported nutrient containing materials, date, tons or volume, description of the material (ie. agreements)
5. Biosecurity protocols for the operation

17 Part 17 - Forms

17.1 *FARM UNIT DECLARATION FORM*

A Farm Unit as defined by the Regulations of the Nutrient Management Act is the basis for a Nutrient Management Strategy and/or Nutrient Management Plan. All parts of the Nutrient Management Strategy or Plan are with respect to the landbase and any agricultural facilities declared in that Farm Unit and not to any other landbase or agricultural facilities. An Operator of an agricultural operation may declare more than one farm unit within that operation, provided each separate Farm Unit fits the definition. There is no minimum land ownership requirement for the land included in the farm unit. Manure/Biosolid Application Agreements are required for property that is included in the Farm Unit but not owned. There is no maximum number of Nutrient Units per Farm Unit.

A: Contact Information

Operation Identifier:
Category of Operation:
Farm Unit Operator:
Mailing Address:
Telephone and Email Address:

B: Location of all the Generating and Storage Facilities that are Part of this farm unit

Type of facility	Lot	Concession	Township	County

C: Location and Identification of Land that is Part of this Farm Unit.

Give each farm or field a unique name that will also be used the nutrient management plan for this farm unit.

Farm or Field Name	**Lot, Concession**	**Township, County**	**Former Township**
Roll Number	**911 Location (if applicable)**	**Property Identification Number**	**Tillable Acreage**

☐ Not owned, agreement attached

Farm or Field Name	**Lot, Concession**	**Township, County**	**Former Township**
Roll Number	**911 location (if applicable)**	**Property Identification Number**	**Tillable Acreage**

☐ Not owned, agreement attached

Farm or Field Name	**Lot, Concession**	**Township, County**	**Former Township**
Roll Number	**911 Location(if applicable)**	**Property Identification Number**	**Tillable Acreage**

☐Not owned, agreement attached

☐More facilities listed on the back of this form.	☐More land listed on the back of this form.

D. Declaration:

In accordance with this information, I, _____ (farm unit operator) declare that all facilities and property listed on this form comprise the entirety of this Farm Unit. I acknowledge that I am required to complete a nutrient management plan and/or Strategy, and that such nutrient management strategy and/or plan shall include all of the lands identified on this form.

I hereby warrant that the information contained on this form is true, and that **I have legal signing authority** to complete this document, as if taken under oath.

Indicate whether the operation that this farm unit is in, is either

☐Corporation Name:
☐Division of a Corporation, Name:
☐Partnership, Name Partners:
☐Sole Proprietorship, Name of business:

Farm Unit Operator (print)	Signature	Date

Witness (print)	Signature	Date

Note: The information in this form can be created using the NMAN software, so for software users the paper version of this form does not have to be used.

17.2 *STRATEGY DESCRIPTION FORM*

Note to users of this form: This form does not represent the entirety of a nutrient management strategy. It is meant to be used to gather the information contained in the common elements of a nutrient management strategy whether the user of the form is an agricultural operation or non-agricultural operation. Please refer to the Nutrient Management Protocol for a description of a complete nutrient management strategy for your operation type.

☐ New nutrient management strategy, or ☐ Renewal of nutrient management strategy

Operation Identifier:
Operator:
Mailing Address:
Telephone and Email:

A. Description of the Operation

Note: The information in this form can be created using the NMAN software, so for software users the paper version of this form does not have to be used.

17.3 *NUTRIENT MANAGEMENT STRATEGY OR PLAN CERTIFICATION FORM*

A. Certificate Reference

Name of Operator:

Address and Telephone:

Operation Identifier:

Nutrient Management Strategy and or Plan Number:

B. Certificate Signed by the Person who Prepared the Nutrient Management Plan or Strategy

I _____, hereby certify that based on relevant information provided in good faith and excluding unforeseen or uncontrollable circumstances, the recommendations contained in the attached report are compliant with the Nutrient Management Act.

Name (print)	Signature:	Date:

C. Certificate Signed by Farm Unit Operator

The farm unit operator who is developing this nutrient management plan and/or strategy and who has authorized a consultant in agriculture to review their nutrient management strategy or plan shall append the following statement to the report.

I _____, hereby certify that I have reviewed my nutrient management strategy and /or plan and I shall, in good faith, follow and implement the recommendations as set out within it.

Name (print)	Signature:	Date:

D. Certificate signed by Reviewer from Ontario Ministry of Agriculture and Food

I,_____, have reviewed the nutrient management plan or strategy and confirm that it meets the nutrient management review criteria of the Ontario Ministry of Agriculture and Food.

Name (print)	Signature:	Date:

Note: The information in this form can be created using the NMAN software, so for software users the paper version of this form does not have to be used.

17.4 *MANURE OR BIOSOLID APPLICATION AGREEMENT*

Land Owner Name: **Address and Telephone:**

Farm Unit Operator Name: **Operation Identifier:**	**Nutrient Management Plan Number:**

This agreement, between the above parties, allows for the following fields to be included in the farm unit operator's Declaration and for application of manure or biosolids to these fields under the farm unit's nutrient management plan.

List each field/section under this agreement:

Lot	Concession	Township	County	Tillable Acres	Roll Number

☐ There are more fields listed on the back of this form.

I, _____(landowner) give permission to _____(farm unit operator) to incorporate the above lands into Nutrient Management Plan #_____.
I also give permission to them to do soil sampling on the properties listed to determine the condition of the soil. I also agree that the land identified in this agreement will not be used for the application of any other prescribed material, originating from any other operation, including my own (if I have any) during the term of this agreement. This agreement shall be in force for a minimum period of one (1) year, commencing on _____and ending on _____. Pollution liability insurance will be carried by _____(farm unit operator) to cover spill cleanup and liability.

Land Owner Name (please print)	Signature	Date
Farm Unit Operator Name (please print)	Signature	Date
Witness Name (please print)	Signature	Date

Note: Permission to use these lands is required from all property owners listed on the title to the land. For properties owned by more than one person, permission may be given by additional owners in the form of a signature on this form or a signed letter accompanying this form.

17.5 *BROKER AGREEMENT*

Broker Name and Operation Identifier:

AND

Generator		
Name:	Operation Identifier:	Strategy Number:

OR

Receiver		
Name:	Operation Identifier:	Strategy or Plan Number:

This agreement, between the above listed parties, is for the transfer of the prescribed material identified as:

- ☐ Farm Animal Manure
- ☐ Washwaters from Ag Operations
- ☐ Pulp and Paper Sludge
- ☐ Leachate from on-Farm Feed Storage
- ☐ Runoff from Livestock Yards or Manure Storage
- ☐ Greenhouse and Nursery leachate
- ☐ By- Products of On-Farm Processing, includes fruit and vegetable matter
- ☐ Organic Materials Produced by Intermediate Handlers (ie Compost)
- ☐ Biosolids (ie municipal sewage, pulp and paper sludge)

The quantity being transferred is:

The Parties to this Agreement Hereto Agree as Follows:
This agreement shall be in force for a minimum period of one (1) year commencing _____ and ending _____.

The terms of this agreement shall strictly apply to the present Broker. Should the Broker use the nutrient in a manner, which is demonstrated to cause environmental harm, the agreement ceases to apply.

The nutrients included in this agreement will be managed under a nutrient management strategy or plan.

Generator or Receiver Name (please print)	Signature	Date
Broker Name (please print)	Signature	Date
Witness Name (please print)	Signature	Date

17.6 *PRESCRIBED MATERIAL TRANSFER AGREEMENT*

Generator		
Name:	Operation Identifier:	Strategy Number:

AND

Receiver		
Name:	Operation Identifier:	Strategy or Plan Number:

This agreement, between the above listed parties, is for the transfer of the prescribed material identified as:

- ☐ Farm Animal Manure
- ☐ Washwaters from Ag Operations
- ☐ Pulp and Paper Sludge
- ☐ Leachate from on-Farm Feed Storage
- ☐ Runoff from Livestock Yards or Manure Storage
- ☐ Greenhouse and Nursery leachate
- ☐ By- Products of On-Farm Processing, includes fruit and vegetable matter
- ☐ Organic Materials Produced by Intermediate Handlers (ie Compost)
- ☐ Biosolids (ie municipal sewage, pulp and paper sludge)

The quantity being transferred is:

The Parties to this Agreement Hereto Agree as Follows:

- The receiver will manage these nutrients in their nutrient management strategy or plan.
- The receiver if a farm unit will include the land that these materials are applied to in their farm unit and therefore on their Farm Unit Declaration.
- The Generator will include these prescribed materials in their nutrient management strategy.
- Both parties will include this agreement in their nutrient management strategy and/or plan.
- The Generator and the Receiver warrant that between them there is adequate storage these prescribed materials that meets the regulations for construction and siting.
- The terms of this agreement shall strictly apply to the present Receiver. Should the Receiver use the nutrient in a manner, which is demonstrated to cause environmental harm, the agreement ceases to apply.

This agreement shall be in force for a minimum period of one (1) year commencing _____ and ending _____.

Generator Name (please print)	Signature	Date
Receiver Name (please print)	Signature	Date
Witness Name (please print)	Signature	Date

17.7 *DRAFT CONTENT AND FORMAT OF NMS FOR NON AGRICULTURAL (MUNICIPALITY AND INDUSTRY) OPERATIONS GENERATING AND LAND APPLYING NUTRIENT MATERIALS*

If you are a nutrient generator of land applied nutrients, you must submit a nutrient management strategy to the Ministry of the Environment, Environmental Assessment and Approvals Branch, for review every five years. In addition you are responsible for a documented annual update that will be available on site.

Nutrient Management Strategy. Prepare and submit Part I through Part V.

Part I – Facility Description and Approval Information

Facility Name:	Date of Submission: day/month/year (Must be 90 days before required due date)
Facility Address (physical location): street number, street, city/town	Date of Approval: day/month/year
	Approving Director signature: day/month/year
Facility's Representative Name: (person responsible for this NMS)	Date of Expiry (5 Years from Submitted Date): day/month/year
Facility's Representative Sign-Off Signature:	Total Volume of materials produced at facility cu.m./day or dry tonnes/yr

Part II: Material Description and Storage Information

Type(s) of Material Produced (e.g. sewage biosolids, pulp and paper biosolids, waste water)	Description of Material (solid, liquid, mixed)	Average Annual Volume (Period of Plan)	Storage				
			On-Site X	Off-Site X	If Off-Site, list physical location of each storage facility	CofA No. - issue date & expiry date (da/mon/yr)	Storage capacity (Imp. Gal /tonnes/$m^{3)}$

Part III: Projected Five-Year Strategy for Materials Generated

	Volume (Imp. Gal/tonnes/m^3)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Land Application					
Landfill Disposal					
Incineration					
Processed(composting, etc.)					
Other					
TOTAL					

If volumes have changed between years, describe why this has occurred:

Part IV: Analysis of Materials

Provide a strategy for the analysis of materials that includes:
sampling of materials for metals and pathogens;
determining odour categories;
monitoring and analysis of results and record keeping; and
providing required data to haulers.

The sampling strategies must meet or exceed the standards established in the Regulations and Protocols.

Part V: Contingency Plan

A written contingency plan is required that outlines alternative actions in the event that the strategy cannot be followed:
Alternate Storage
Alternative Disposal

For spills, non-agricultural facilities are subject to regulation 347, Part IX, of the *Environmental Protection Act*.

Annual Strategy: Complete Part VI annually. Submit Year One with Nutrient Management Strategy. Prepare Year Two through Year Five annually and retain on site with Nutrient Management Strategy. Submit completed copies of Part VI for all five years, with the subsequent Nutrient Management Strategy.

Part VI: Destination of Materials - Land Application, Landfill, Incineration, Processed, Other.

Land Application (copy sheet if more than 1 hauler)			Year of Strategy:			
Name of Hauler Company: System CofA Number or Certification Number:						
	Site CofA # or NMP# & Site CofA Expiry Date (dd/mm/yy)	NMP # & NMP Expiry Date (dd/mm/yy)	Approved Area for Application (Acres)	Approved Application Rate (Imp. Gal./tonnes/m^3 per acre)	Total Volume to be applied (Imp. Gal./ tonnes/m^3)	Storage Capacity Volume (Imp.Gal./ tonnes/m^3)
Site 1						
Site 2						
Site 3						
Site 4						
Site 5						
Site 6						
Site 7						

Landfill Disposal	Year of Strategy:

Name of Landfill Site	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Landfill Cover				
		daily cover X	interim cover X	final cover X	Receiving Site and CofA Number	Cover Volume (Imp. Gal /tonnes/m^3)

Incineration		Year of Strategy:	
Total Volume Disposed (Imp. Gal./tonnes/m^3)	On Site X	Off Site Location Address	CofA A Number (if applicable)

Processed Material (composting etc.)	Year of Strategy:				
Describe Type of Process (compost, other)	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Other Disposal Methods (reported annually)		Year of Strategy:			
Describe Method	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Other Disposal Methods (reported annually)		Year of Strategy:			
Describe Method	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Annual Report: Complete Part VII and Part VIII within 60 days of each year end and retain on site with Nutrient Management Strategy. Submit completed copies of Parts VII and VIII for all five years, with the subsequent Nutrient Management Strategy.

Part VII: Report on Management of Materials - Land Application, Landfill, Incineration, Processed, Other.

Land Application Report (copy sheet if more than 1 hauler) (annual)			Year end for Strategy Year:			
Name of Hauler Company: System CofA Number or Certification Number:						
	Site CofA # or NMP# & Site CofA Expiry Date (dd/mm/yy)	NMP # & NMP Expiry Date (dd/mm/yy)	Approved Area for Application (Acres)	Approved Application Rate (Imp. Gal./tonnes/m^3 per acre)	Total Volume applied (Imp. Gal./ tonnes/m^3)	Stored Volume (Imp.Gal./ tonnes/m^3)
Site 1						
Site 2						
Site 3						
Site 4						
Site 5						
Site 6						
Site 7						

Landfill Disposal Report (annual)	Year end for Strategy Year:					
Name of Landfill Site	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Landfill Cover				
		daily cover X	interim cover X	final cover X	Receiving Site and CofA Number	Cover Volume (Imp. Gal /tonnes/m^3)

Incineration Report (annual)		Year end for Strategy Year:	
Total Volume Disposed (Imp. Gal./tonnes/m^3)	On Site X	Off Site Location Address	CofA A Number (if applicable)

Processed Material Report(composting etc.)	Year end for Strategy Year:				
Describe Type of Process (compost, other) (annual)	Total Volume Disposed (Imp. Gal./tonnes/ m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Other Disposal Methods Report (annual)		Year end for Strategy Year:			
Describe Method	Total Volume Disposed (Imp. Gal./tonnes/m^3)	Location		CofA No. for receiving site (if applicable)	NMS No. for receiving site (if applicable)
		on site X	offsite address		

Part VIII: Report on Five-Year Strategy for Nutrient Materials Generated

	Total Volume (Imp. Gal/tonnes/m^3)

	Year 1	Year 2	Year 3	Year 4	Year 5
Land Application					
Landfill Disposal					
Incineration					
Processed(composting, etc.)					
Other					
TOTAL					
If volumes have changed between years, describe why this has occurred:					

18 Part 18 – Appendix

18.1 *OMAF NMAN COMPUTER PROGRAM*

18.2 *OMAF NUTRIENT MANAGEMENT WORKBOOK*

Nutrient Management Worksheet (For 'Cash Crops' Ignore Manure sections)

A	Field Information No.____ Field ID _____ Field Size_____ ac Crop Type _____ Yield _____ Previous Crop _____ Soil Texture_____ Soil Hydrologic Group____ Soil Test: Sodium Bicarbonate P____mg/l Ammonium Acetate K ____mg/l

B	Manure* Information Description _____ Application Rate (F)_____ Time of Application: ☐ L Summer ☐ E Fall ☐ L Fall ☐ Spring PP ☐ Spring SD ☐ Summer Incorporation: Incorporated: ☐ 1 day ☐ 3 days ☐ 5 days ☐ Not Incorporated ☐ Injected Nutrient Values: lb/1000 gal lb/1000 gal lb/1000 gal N: _____ lb/ton P_2O_5 _____lb/ton K_2O:_____lb/ton Nutrients from Manure are calculated as Nutrient Value multiplied by Application Rate.

	Agronomic Nutrient Balance	N	(lbs/acre) P_2O_5	K_2O
C	Fertilizer	+_____	+_____	+_____
D	Previous Crop	+_____		
E	Previous Manure	+_____		
G	This Year's Manure	+_____	+_____	+_____
H	Production Requirements	-_____	-_____	-_____
I	Agronomic Nutrient Balance	_____	_____	_____

	Crop Removal Balance	N	(lbs/acre) P_2O_5	K_2O
J	Field Inputs (Line C+D+E)	+_____	+_____	+_____
K	This Year's Manure	+_____	+_____	+_____
L	Crop Removal	-_____	-_____	-_____
M	Crop Removal Balance	_____	_____	_____
N	N Available for Potential Loss	_____		

O	Nitrogen Index: N-Index Value = Value A _____ + Value B _____ = _____ Maximum N-Index Value = _____ (Determine from chart in Section O)

P	Phosphorus Index: a)____ +b)____ + c)____ +d)____ + e)____ = _____
Q	Minimum Separation Distance from Surface Water _____
	Minimum Separation Distance from Wells and Bedrock Issues to be added
R	Useable Acreage _____

*In this workbook, "Manure" includes any nutrient source other than commercial fertilizer

B. Manure Information

Enter the description, time of application, and incorporation details for the manure applied to this field.

Method #1 – Using Information from Manure Analysis Report

Calculate the **available** N, P_2O_5, & K_2O. Some labs may have already done these calculations. Obtain factors 1 & 2 from the charts. The calculations provided here are only valid for spring, pre-plant or in crop applications of manure.

The following conversions may be required:

- to convert % to lb/1000gal multiply by 100
- to convert % to lb/ton multiply by 20
- to convert ppm to % divide by 10000

⚠ Attach manure test results.

Available N

(%N - $\%NH_4N$) X Factor 1+ ($\%NH_4N$ X Factor 2)

(_____ - _____) X _____ + (_____ X _____) = _____% = _____ $\frac{lb/1000gal}{lb/ton}$

Available P_2O_5

%P _____ X 0.92 = _____% = _____ $\frac{lb/1000gal}{lb/ton}$

Available K_2O

%K _____ X 1.08 = _____% = _____ $\frac{lb/1000gal}{lb/ton}$

Factor 1: Available Organic N

Liquid		Liquid & Solid	Solid		
Poultry	All Other	Biosolids	Poultry	<50% dry matter	>50% dry matter
0.3	0.2	0.3	0.3	0.1	0.05

Factor 2: Ammonium Retention

Incorporation Details	Injected	Incorporated			Not Incorporated	
		1 day	3 days	5 days	Bare Soil	Residue
Retention Factor	1.00	0.75	0.65	0.55	0.34	0.50

Example:

A farmer has liquid swine manure of 0.3% N, 0.1% P, 0.2% K, and 1000 ppm NH_4N (0.1%). He plans to incorporate the manure within 3 days.

N: (0.3 – 0.1) X 0.2 + 0.1 X 0.65 = 0.105% = 10.5 lb/1000gal

P_2O_5: 0.1 X 0.92 = 0.092% = 9.2 lb/1000gal

K_2O: 0.2 X 1.08 = 0.216% = 21.6 lb/1000gal

Method 2: Using Typical Analysis (Data Bank), or Lab Analysis for Fall Applied Manure

Using Data Bank Information

Where a manure analysis is not available, use the numbers in the typical analysis chart below and the formulas to determine average N, P_2O_5 and K_2O values.

% to lb/1000gal multiply by 100
to convert % to lbs/ton multiply by 20

Available N

%Total N X Factor 1=_____X _____=_____% = _____ $\frac{\text{lb/1000gal}}{\text{lb/ton}}$

Available P_2O_5

%P _____ X 0.92 = _____% = _____ $\frac{\text{lb/1000gal}}{\text{lb/ton}}$

Available K_2O

%K _____ X 1.08 = _____% = _____ $\frac{\text{lb/1000gal}}{\text{lb/ton}}$

Factor 1: Available Nitrogen (as a Proportion of Total Nitrogen**)

Application Time	**Incorporated** (<24 hours)					**Not Incorporated**				
	Late Summer	Early Fall	Late Fall	Pre-Plant	Side-dress	Early Fall	Late Fall	Pre-plant		Side-dress
								Bare Soil	Residue	
Urea (commercial N)	.1	.2	.5	1	1	.1	.4	.85	.75	.85
Solid Cattle/Sheep	.3	.3	.3	.4	--	.25	.2	.2	.2	.2
Solid Poultry	.3	.4	.5	.6	--	.3	.3	.3	.3	.3
Liquid Cattle	.3	.4	.5	.6	.7	.3	.4	.5	.55	.6
Liquid Swine	.2	.3	.4	.7	.8	.2	.3	.4	.45	.5
Liquid Biosolids	.3	.4	.5	.6	.7	.3	.4	.5	.55	.6

Source: Adapted from Barry, Beauchamp et al U of Guelph 2000

* Available N = Total Manure N applied x Factor 1 (assumes a spring planted crop)

**accounts for ammonia loss to atmosphere and mineralization of organic N

For manure incorporated within 3 days Use: (incorporated value + non-incorporated value)/2

NMAN uses a more detailed method of determining available N. For different incorporation periods, NMAN will provide more precise estimates of available N.

Where a cover crop is utilized and manure is applied in late summer or fall, use the late fall column to determine the Available Nitrogen for the next crop.

⚠ Where manure is applied following the harvest of a crop (late summer or fall), Section O (Nitrogen Index) must be completed.

Typical Analysis Chart

Type of Manure	% Dry Matter	% Total Nitrogen	% Organic Nitrogen	% P	% K
Liquid					
Beef**	6	.28	.13	.08	.18
Dairy – outside storage*	6	.30	.14	.07	.23
Dairy –under barn storage*	8	.41	.20	.09	.29
Dairy heifers	11	.55	.30	.13	.32
Poultry layers	10	.74	.22	.26	.30
Swine- sows/weaners	3	.35	.11	.10	.15
Swine – finishers	5	.49	.19	.16	.20
Swine finishers -wet/dry feeders	6.5	.58	.23	.20	.24
Liquid Runoff	1.0	.10	.04	.02	.12
Liquid Biosolids - anaerobic	4.4	.28	.19	.14	0
Milk-fed Veal	1.5	.08	.24	.02	.18
Solid					
Beef	25	.72	.64	.25	.59
Dairy	20	.55	.42	.16	.47
Poultry – layers	20	1.15	.51	.51	.43
Poultry – broilers	> 50	2.73	2.3	1.3	1.45
Sheep	30	1.06	.61	.59	.70
Horses	50	.32	.28	.26	.61

Source: NMAN Data Bank. 2001

* assumes milkhouse wastes

**assumes some yard runoff

Example:

A farmer has liquid hog manure from a finishing barn. He does not have wet/dry feeders. He will apply the manure in late April and plans to incorporate his manure within 24 hours. Since a manure test is not available he uses the above chart and the calculations to find available N, P_2O_5 and K_2O. He finds his manure to have the following nutrients available the first growing season:

N: .49% X .7 (factor 1) X 100 = **34.3** lb/1000gal
P_2O_5: .16% X .92 X 100 = **14.7** lb/1000gal
K_2O: .22% X 1.08 X 100 = **23.8** lb/1000gal

D. Previous Crop Nitrogen Input

Use the following chart to determine the reduction in nitrogen requirement for this year's crop.

Crop	N (lb/ac)
Established Forage - under 1/3 legumes	0
Established Forage - 1/3 to 1/2 legumes	50
Established Forage - over 1/2 legumes	100
Perennial Legumes plowed in Seeding Year	40
Corn following Soybeans (< 2800 chu)	30
Corn following Soybeans (> 2800 chu)	15
Corn following Silage Corn (< 2800 chu)	10
Corn following Cereals - straw removed (< 2800 chu)	10
Non legume fall cover crop (with applied manure)	20
Other crops	0

Source: OMAFRA Publication 296 – Field Crop Recommendations

Example:

A field that receives 2900 heat units was planted to soybeans last year. From the above chart, the N reduction for this year's crop is 15 lb/ac.

E. Previous Manure Nitrogen Input

If a representative manure test is available, use the following formula to determine the organic N content of the manure. (To convert: % to lb/1000gal multiply by 100, % to lb/ton multiply by 20.)

Organic N = %N - $\%NH_4N$

_____ - _____ = _____ **% Organic N =** _____ lb/1000gal / lb/ton

If a manure test is not available, use the % Organic N in the manure analysis chart in section B.

Organic N is available in the following percentages:
10 % for manure applied **last year**
5 % for manure applied **two years ago**
2 % for manure applied **three years ago**

Calculate the amount of nitrogen available to this years crop. Then add the result for each of the past 3 years.

$$\text{N Available} = \text{Application Rate} \times \text{Organic N} \times \% \text{ Available}$$

Example Calculation:
Last year liquid swine manure was applied to this field at 5000 gal/ac and three years ago at 7000 gal/ac. The manure has an organic N content of 0.19% (0.0190 lb/gal or 19.0 lb/1000gal).

N Available = (5000 gal/ac)().0190 lb/gal)(10%) + (7000 gal/ac)(0.0190 lb/gal)(2%)
= 9.5 + 2.5 = 12 lb/ac

F. Liquid Manure Application Rate

Estimate a manure application rate. For liquid manure, make sure that the rate does not exceed the maximum allowable application rate specified in the charts below. You may consider several separate applications to allow higher rates (provided nutrient levels are acceptable). For solid manure, it is not necessary to evaluate the maximum application rate for runoff concerns.

Maximum Application Rate

Runoff Potential	Surface Applied	Incorporated or Pretilled
High	4450 gal/ac	6700 gal/ac
Moderate	6700 gal/ac	8900 gal/ac
Low	8900 gal/ac	11600 gal/ac
Very Low	11600 gal/ac	13400 gal/ac

STOP The application rate must not exceed the above numbers.

Runoff Potential

Soil Hydrologic Group	Maximum Sustained Field Slope			
	< 3 %	3 - 6 %	6 - 9 %	9-12 %
A (Rapid)	Very Low	Very Low	Low	High
B (Moderate)	Very Low	Low	Moderate	High
C (Slow)	Low	Moderate	High	No Application
D (Very Slow)	Moderate	High	High	No Application

Use the runoff potential to determine the maximum allowable application rate. Soil Hydrologic Group is found in Table 3.

Example

After several tries an application rate of 3000 gal/ac was selected. For the clay loam soil (Group C, or "Slow") on a 4% slope this rate is less than the maximum of 6700 gal/ac.

H. Ontario Crop Production Requirements

Using soil test results, obtain production requirements from OMAFRA Publication 811, 360, 610, 383, 384, 298, or 363. Recommendations for some common crops are displayed in the tables below.

N Recommendations

Corn:

Location	N Recommendations (lb/ac)				
Expected Yield (bu/ac):	*100*	*130*	*150*	*160*	*175*
Eastern Ontario	85	120	150	160	180
Western / Central Ontario (<2700 chu)	95	110	120	120	125
Midwestern Ontario (2700-2900 chu)	125	140	150	150	160
Southwestern Ontario (>2900 chu)	150	165	175	180	190

For side dress applications in SW Ontario reduce N recommendations by 15%

Winter Wheat and Canola:

	N Recommendations (lb/ac)			
Expected Yield (bu/ac):	*35*	*60*	*70*	*80*
Winter Wheat (soft white/red)	---	75	85	100
Winter Wheat (hard red)	---	110	120	135
Spring Canola (< 2300 chu)	120	120	120	---
Spring Canola (> 2300 chu)	90	90	90	---
Winter Canola (at planting) - spring	(35) - 145	(35) - 180	(35) - 190	---

Source: OMAFRA Publication 811 Agronomic Guide for Field Crops

Soybeans, Alfalfa: N Recommendations = 0 (with proper inoculation)

Example: A field located in eastern Ontario has a P soil test of 35 ppm and K soil test of 79 ppm. The field is to be planted to corn and is expected to yield 135 bu/ac. The N requirement is obtained

from the top chart by estimating the yield between 130 bu/ac and 150 obu/ac. The N recommendation is approximately 128 lb/ac.

I. Agronomic Nutrient Balance

N: N Balance = Line C + Line D + Line E + Line G - Line H

P_2O_5: P_2O_5 Balance = Line C + Line G - Line H

K_2O: K_2O Balance = Line B + Line G - Line H

Calculate the agronomic nutrient balance for N, P_2O_5, and K_2O. For soybeans and legume forages (or any crop with a zero nitrogen recommendation), calculate the crop removal for nitrogen.

Discussion of Limits

A Positive numbers indicate over application of nutrients (surplus) while negative numbers indicate under application (potential deficiency) of nutrients for this crop.

⚠ If the N agronomic balance (Line I) exceeds 15 lb/ac, complete Section J "Crop Removal Balance" and Section O "Nitrogen Index".

⚠ If the N or P_2O_5 or K_2O balance is negative a reduction in crop yield may be observed. Consider adding commercial fertilizer or increasing the rate of manure application.

⚠ If the P_2O_5 or K_2O balance exceeds 15 lb/ac then significantly more nutrients are being applied to the field than are required by the crop. It may be more economical to apply the extra manure to another field.

⚠ If P_2O_5 balance exceeds 15 lb/ac, it is necessary to complete the 'Crop Removal Balance' for phosphorous (section J to M).

Crop Removal Balance (for legume crops or crops without N recommendations)

J. Field Inputs

N: N Inputs = Line C + Line D + Line E

P_2O_5: P_2O_5 Inputs = Line C

Calculate the field inputs for the Crop Removal Balance.

K. Manure Nutrients Applied

N Applied = Line G

P2O5: P_2O_5 Applied = Line G × 2

Calculate tne manure nutrients applied for the crop removal balance.

Note: N applied in manure is the same as the agronomic balance. P2O5 nutrients are doubled to account for an 80% phosphorus available for soil buildup (only 40% is available to this years crop).

L. Crop Removal

Use the following chart and equation to determine the nutrient removal value(s) for this year's crop.

Crop	Base Yield	Removal Base Value(lb/ac)	
		N	P_2O_5
Corn	150 bu/ac	120	61
Corn Silage	18 ton/ac	206	92
Wheat (soft red/white)	75 bu/ac	90	44
Wheat (hard red)	75 bu/ac	105	44
Barley	75 bu/ac	74	29
Soybeans	50 bu/ac	194	42
Oats	75 bu/ac	54	19
Alfalfa	5 ton/ac	316	66
Canola	45 bu/ac	95	55

Source: Potash and Phosphorus Institute (PPI)

$$\text{Crop Removal} = (\text{Base Value})\left(\frac{\text{Estimated Yield}}{\text{Base Yield}}\right)$$

Example:
A crop of corn is expected to yield 135 bu/ac. What is the P_2O_5 crop removal value?

$$P_2O_5 \text{ Crop Removal} = (61 \text{ lb / ac})\left(\frac{135 \text{ bu / ac}}{150 \text{ bu / ac}}\right) = 55 \text{ lb / ac}$$

M. Crop Removal Balance

$$\text{Nutrient Balance} = \text{Line J} + \text{Line K} - \text{Line L}$$

Calculate the crop removal balance for the appropriate nutrient(s).

Discussion of Limits
A negative balance indicates that this year's crop is removing more nutrients from the soil than are being added through manure and field inputs. Soil test values may decrease for next year.

A positive balance indicates that manure and field input nutrients exceed those removed from the soil by this year's crop. Soil test values may increase for next year. Upper limits for the application of nutrients have been established and are outlined below.

N Limits

⚠ Complete Section O (Nitrogen Index)

STOP The total amount of N (Line J + Line K) applied to the field should not exceed +200 lb/ac in any single year, or the actual crop removal if it is greater than 200 lb/ac. Attach supporting documentation if this is the case.

P_2O_5 Limits

STOP The P_2O_5 balance must not exceed +70 lb/ac (Line M). If manure is applied once every two years this limit may be raised to +140 lb/ac. If manure is applied once every three years this limit may be raised to +210 lb/ac. Additional land base must be documented. Above these levels, the risk of surface water contamination may exist.

N. Nitrogen Available for Potential Loss

Determine "Factor 2" for N applied following crop harvest (see Table of "Factor 2 Values Below:)

Factor 2: Estimate of N Available for Loss (Leaching or Denitrification)*

Application Time	**Incorporated** (<24 hours)					Not Incorporated				
	Late Summer **	Early Fall**	Late Fall	Pre-Plant[1]	Side-dress[1]	Early Fall **	Late Fall	Pre-plant[1] Bare Soil	Pre-plant[1] Residue	Side-dress[1]
Urea (commercial N)	.8	.7	.5	0	0	.4	.5	0	0	0
Solid Cattle/Sheep	.15	.125	.1	.05	---	.1	.05	0	0	0
Unbedded Solid Poultry* **	.4	.3	.2	.1	---	.3	.2	.1	.05	0
Bedded Solid Poultry	.4	.3	.2	.1	---	.1	.05	0	0	0
Liquid Cattle	.4	.3	.2	.1	.05	.3	.2	.1	.05	0
Liquid Swine	.6	.5	.3	.1	.05	.3	.2	.15	.1	0
Liquid Biosolids	.4	.3	.2	.1	.05	.3	.2	.1	.05	0

* assumes a spring planted crop Source: Adapted from Barry, Beauchamp et al., U of G 2000

** use late fall number where a fall cover-crop is being grown

***Unbedded solid poultry manure is usually from caged layers and has dry matter > 50%

For manure incorporated within 3 days Use: (incorporated value + non-incorporated value)/2

Calculate the Nitrate Leaching Risk Index (Section O).

N Available for Loss = Total N (lbs/gal)____ **X Application Rate**____ **X Factor 2**____= -
_____ (lbs/ton)

(To convert lb/1000 gal to lb/gal divide by 1000)

O. Nitrogen Index

For all crops, use the Table below to calculate the N-Index.

Value A) Nitrogen in Excess of Crop Removal

Crop Removal Balance* (Line M)	Value A
< 15	0
15 – 30	1
31 – 45	2
46 – 60	3
61 – 80	4
81 - 120	5
> 120	STOP

Value B) Nitrogen Available for Loss

N Available for Loss (Line N)	Value B
< 15	0
15 – 25	1
26 – 35	2
36 – 45	3
46 – 60	4
61 - 80	5
> 80	STOP

Add the values from each section to get the total N-Index

N-Index Value = A _____ + B _____ = _____

Determine the Hydrologic Soil Group Category for the field from the soil types (soil series names) present in the field. Hydrologic soil Groups corresponding to the various soil series names found in Ontario are listed on the next page or in the Ontario Drainage Guide (publication 29)

Determine the Maximum Index Value for the Critical Hydrologic Soil Group for the field from the Table below:

N-Index Value related to Soil/Site Risk

Hydrological Soil Group	Leaching Risk	Maximum N-Index Value
AA	Very high	1
A	High	3
B	Medium	4
C	Low	6
D	Very Low	9

* Soils shallow to bedrock move up one risk level

The N-Index Value must not exceed the maximum N-Index number determined from the above chart for the field of concern.

Table 3: ONTARIO SOIL SERIES AND HYDROLOGIC SOIL GROUP

SOIL SERIES	HYDROLOGIC SOIL GROUP	SOIL SERIES	HYDRO LOGIC SOIL GROUP	SOIL SERIES	HYDROLOGIC SOIL GROUP
Alberton	D	Christy	C	Grand	B
Allendale*	C	Clyde	D	Grenville*	B
Alliston*	B	Codrington	C	Grimsby*	A
Almonte	C	Colborne	A	Guelph*	B
Ameliasburg	D	Colwood*	C	Guerin*	B
Ancaster	B	Conestoga	B	Gwillimbury	B
Appleton	B	Conover	C	Haldimand	C
Atherley	D	Cooksville	B	Hampden	D
Ayr	C	Craigleith	C	Harkaway*	B
Bainsville	C	Cramahe	A	Harriston	B
Balderson	B	Crombie	C	Harrow	A
Bamford	B	Dalton	C	Havelock	A
Bancroft	A	Darlington	B	Hawkesville	C
Bass	D	Deloro*	B	Haysville	B
Battersea	C	Donald	B	Heidelberg	B
Bearbrook	D	Donnybrook	A	Hendrie	B
Belmeade	D	Dorking	D	Hespeler	C
Bennington	B	Dumfries*	A	Hillier	B
Berriedale	A	Dummer*	B	Hillsburgh	A
Berrien	C	Dundonald	B	Hinchinbrooke*	C
Beverly*	C	Dunedin	C	Honeywood	B
Binbrook	C	Eamer	B	Howland*	B
Blackwell	D	Earlton*	B	Huron	C
Bolingbroke	A	Eastport	A	Innisville	C
Bondhead*	B	Edenvale	C	Jeddo	D
Bookton	B	Eganville*	B	Kagawong	B
Boomer	B	Elderslie	C	Kars	A
Brady*	B	Eldorado	B	Kelvin	D
Brant*	B	Ellwood	C	Kemble*	C
Brantford	C	Elmbrook	C	Kenabeek	C
Bridgman	A	Elmira	C	Killean	B
Brighton	A	Elmsley	B	King	C
Brisbane*	B	Embro	C	Kirkland	A
Brockport	B	Emily*	B	Kossuth	B
Brooke	C	Englehart	C	L'Achigan	B
Brookston	D	Evanturel*	B	Lambton	C
Bucke	B	Farmington	B	Lanark	C
Burford*	A	Ferndale	D	Landsdowne*	D
Burnbrae	B	Flamboro*	C	Leech*	D
Burnstown*	B	Floradale	B	Leith	B

Burpee	C
Buzwah*	C
Caistor	C
Caledon	A
Camilla	B
Campbell*	C
Cane*	D
Carp*	C
Casey	B
Cashel	C
Castor*	C
Chesley	D
Chinguacousy*	C
SOIL SERIES	**HYDROLOGIC SOIL GROUP**
Macton	B
Magnetawan	C
Mallard*	B
Malton	D
Mannheim	B
Manotick	B
Maplewood	C
Marionville	C
Marsh	D
Maryhill	C
Matilda	B
Matson	C
Medonte	C
Miami	C
Mill	C
Milliken	B
Minesing	D
Mississauga	D
Monaghan	C
Monteagle*	B
Morley	D
Morrisburg	C
Moscow*	D
Mountain	C
Muck	D
Muriel	C
Murray	C
Napanee*	D
Nelson	C
Newburgh	B

Font	A
Fonthill	A
Fox*	A
Foxboro	C
Franktown	B
Freeport	B
Galesburg	B
Gananoque*	C
Gerow	C
Gilford	C
Gobles	C
Gordon*	D
Granby	C
SOIL SERIES	**HYDRO LOGIC SOIL GROUP**
Peat	D
Peel	C
Pelham	A
Perch	D
Percy	B
Perth	C
Petherwick	C
Phipps*	D
Piccadilly	D
Pike	C
Pike Lake	A
Plainfield	A
Pontypool	A
Preston	B
Renfrew	D
Rideau	D
Rubicon*	B
Sargent	A
Saugeen	C
Schomberg	C
Scotland	A
Seely's Bay	C
Senaca	B
Shashawandah	B
Sidney*	D
Silver Hill	B
Simcoe	D
Smithfield	C
Smithville	C
Snedden	D

Leithrim	B
Lily	C
Lincoln	D
Lindsay*	D
Lisbon	A
Listowel	B
Little Current	B
Lockport	B
London*	B
Lonsdale	D
Lovering	C
Lowbanks	B
Lyons*	C
SOIL SERIES	**HYDROLOGIC SOIL GROUP**
Teeswater	B
Tennyson*	B
Thames	C
Thorah	C
Thwaites	B
Tioga*	A
Toledo*	D
Trafalgar	B
Trent	C
Tuscola*	C
Tweed	B
Uplands	A
Vanessa	C
Vars	B
Vasey*	B
Vincent	C
Vineland*	B
Vittoria	C
Wabi	B
Walshear	C
Walsingham	A
Waterloo	A
Watford	A
Watrin	C
Waupoos	C
Wauseon	C
Wayside	B
Welland	D
Wellesley	C
Wemyss	B

Newcastle	B	Solmesville	C	Wendigo	A
Niagara	C	South Bay	C	Wendover	D
Nipissing	C	Springvale	A	Westmeath	A
Norham	B	St. Clements	C	Whitby	B
Normandale	B	St. Jacobs	A	White Lake*	A
North Gower*	D	St. Peter	A	Whitfield	B
Oakland	B	Ste. Rosalie	D	Wiarton	B
Oakview	D	St. Samuel*	C	Wilmot	D
Oneida	C	St. Thomas	A	Wilsonville	A
Ontario	C	St. Williams	B	Winona	C
Osgoode	C	Stafford	B	Woburn	B
Oshtemo	A	Stockdale	C	Wolford	C
Osnabruck	D	Styx	B	Wolsey*	D
Osprey	B	Sullivan	A	Wooler	B
Otonabee*	B	Tansley	C	Woolwich	B
Otterskin	C	Tavistock	C	Wyevale	A
Parkhill*	C	Tecumseh	B		

* Soil series having shallow phases over bedrock. The hydrologic grouping for the rocky phases of these soils should be reduced one group
(ie. C reduces to B).

** Soil family name not available if not listed.

P. Phosphorus Index

This section needs to be completed if the P soil test exceeds 30 ppm. The P-Index is divided into 5 sections. Add the values from each section to get the total P-Index.
Note: For a more detailed analysis of the Phosphorus Index refer to the Nutrient Management Computer Program (NMAN) or Phosphorus Index Factsheet.

a) Soil Erosion Value

Slope within 500' of watercourse	Length of Slope	Hay	Other Crops Up&Down Slope		Cross Slope	
			Plow	No-till	Plow	No-till
Flat (< 0.5%)	All	2	4	2	4	2
Gentle (0.5–2%)	Short (200 ft)	2	4	2	4	2
Gentle (0.5–2%)	Long (1600 ft)	2	16	4	16	2
Moderate(2-5%)	Short (200 ft)	2	16	2	8	2
Moderate(2-5%)	Long (1600 ft)	2	16	8	16	4
Steep (> 5%)	Short (200 ft)	2	16	4	16	4
Steep (> 5%)	Long (1600 ft)	2	16	16	16	16

Note: These values simulate a worst case scenario of soybeans on very fine sand in a high rainfall area. To obtain more accurate results using the universal soil loss equation refer to the nutrient management computer program (NMAN).

b) Water Runoff Value

Slope	Soil Texture			
	Sand	Loam	Clay Loam	Clay
Flat (1%)	1	1	2	4
Gentle (3%)	1	2	4	8
Moderate(5%)	1	2	4	8
Steep (8%)	2	4	8	8

c) P Soil Test Value

P Soil Test	Factor
< 15 ppm	2
15 - 30 ppm	4
31 - 60 ppm	8
61 - 100 ppm	16
> 100 ppm	32

d) P_2O_5 Fertilizer Value

Rate (Line C)	Method			
(lb / ac)	Placed with Planter	Incorporated < 2 weeks	Incorporated > 2 weeks	Not Incorporated
none	0	0	0	0
< 45	2.5	4	7	13
45 - 67	3.5	5	8	14
> 67	5.5	7	10	16

e) P_2O_5 Manure Value

Rate (Line K)	Method			
(lb / ac)	Injected	Incorporated < 5 days	Not Incorp: Crop Cover	Not Incorp: Bare Soil
None	0	0	0	0
< 33	2.5	4	7	13
33 – 54	3.5	5	8	14
> 54	5.5	7	10	16

Example:

a) corn no-till planted on a 3% slope: 2 b) clay loam soil on a 3% slope: 4
c) P soil test of 35 ppm: 8 d) 9 lb/ac, placed with planter: 2.5
e) 128 lb/ac of P_2O_5 applied in manure, incorporated 3 days: 7
Total P-index = 2 + 4 + 8 + 2.5 + 7 = 23.5

Q Minimum Separation Distance from Watercourse

Use the first chart to determine the surface water runoff potential:

Soil Hydrologic	Maximum Sustained Field Slope			
Group	< 3 %	3 - 6 %	6 - 9 %	9-12 %
A (Rapid)	Very Low	Very Low	Low	High
B (Moderate)	Very Low	Low	Moderate	High
C (Slow)	Low	Moderate	High	No Application
D (Very Slow)	Moderate	High	High	No Application

Use the runoff potential to determine the minimum separation distance.

Minimum Separation Distance (with established buffer zone)

Runoff Potential	Surface Applied		Incorporated or Pretilled	
	Liquid	Solid	Liquid	Solid
High	100 ft	50 ft	60 ft	30 ft
Moderate	75 ft	40 ft	45 ft	20 ft
Low	50 ft	30 ft	30 ft	15 ft
Very Low	30 ft	30 ft	10 ft	10 ft

Note: All farms that require a nutrient management plan must have a minimum 10 foot vegetated buffer adjacent to all surface water. On farms that do not require a nutrient management plan, and do

not have buffers established, the minimum distance to surface water is 33 feet for solid manure, and 66 feet for liquid manure or biosolids

If the phosphorus index has been calculated make sure that the minimum separation distance falls into an acceptable category in the following chart. If not increase the separation distance or lower the P_2O_5 application rate.

P- Index	Separation Distance			
	< 10 ft	10 – 100 ft	100 – 200 ft	> 200 ft
< 30			No additional restriction due to P-Index	
30 – 50		Only apply P_2O_5 up to crop removal (Line M ≤ 0)		
> 50		No application		

Nutrient management Practices BMP

Example:
For a clay loam soil on a 4% slope the runoff potential is *moderate*. For surface applied manure the minimum separation distance is 75 ft. However, since the phosphorus index was completed and P_2O_5 is applied above crop removal (i.e. Line M > 0) the minimum distance must be increased to 100 ft. Between 75 ft and 100 ft manure could be applied up to crop removal.